

COAL AGE

McGRAW-HILL COMPANY, INC.
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Devoted to the Operating, Technical and Business
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Give and Take

WE HAVE ALL the impatience of Eugene McAuliffe with the persons who sit back in their seats and listen to the discussion and who take and never give. We have as much respect for them as we have for those numerous people who are frequently guests at other people's tables and never have guests at their own. If they have nothing of their own to give, of course they are excused, but if they have much and pretend they have none or withhold when they are anxious to receive, theirs is a mean and sordid part indeed. American?—not at all. They live in a little land of their own, making forays on such of their neighbors as they see have, or may have, something they want.

Troubles from New Financing

SOME OF THE large projects being put into operation by money obtained from financing in New York and elsewhere, the money not coming from the industry but from bankers, is occasioning difficulties between capital and labor, for the employees not knowing where the money comes from believe that in some mysterious way it is derived from the profits of coal production. That assumed, they believe the present unprofitability of operation is subject to grave doubt.

Instead, it is the fear that profit will be lacking and losses will be more severe than before, that is making mine owners expend borrowed money for purposes of efficient operation. Operators are obliged to go outside to get the sinews of war to wage a successful fight against competing operators. Especially is this true in the union fields. The mine workers are ill-advised to interfere with operation, because only by large expenditures at the mining plants at which they work can they hope to retain their employment. A few strikes may make the operators less willing to attempt what is so essential for the welfare of both the men and the company.

Coal by Pipe

PROFESSOR GEORGE GUESS, of the University of Toronto, told the British Association for the Advancement of Science that eventually we would circulate powdered coal through pipes to domestic furnaces. He declared that better temperature control and greater economy would result.

The idea is not by any means wild. Gas is not a sufficiently dense fuel for us to get satisfactory results from its piping, even under high pressure. Coal could be circulated as dust under a lower pressure than has been proposed for gas and even though it is mixed with air would deliver many more thermal units than an equal volume of gas. Of course, mixtures of coal dust and air in a pipe might be dangerous when a flame is at the burner, but so far no danger has been experi-

enced, probably owing to the small area of the orifice and the hazard may be as remote as the passing of flame back through gas pipes, though the presence of air in the case of pulverized coal justifies a little caution in adopting such a plan, which might introduce danger if a pipe were broken.

If Professor Guess' suggestion is any more than a mere day dream it would seem advisable that the operators test its possibilities. What a wonderful opportunity for the proposed Coal Institute!

No Time to Idle

WHEN MINES are idle is a good time to clean up fallen airways and mend or replace leaking brattices. Air is getting to be an expensive item in mine costs. It does not pay to drive or draw it through airways choked with fallen rock or filled with heaved clay. It is extravagant to waste it at leaky stoppings. When the mines are idle, the track is clear and empty cars are plentiful is a good time to make these improvements under the vigilant inspection of the mine foremen. It is daywork and so needs close supervision under and above ground.

In such times as these it is well to examine costs and see what it will save to make certain improvements now or later. Too many mines are ruined by robbing airways and headings that might have been kept intact had a thought been given to their possible use as intake or return airways.

This is the time for planning, even if no money is granted for improvements. If the change cannot be made now, the work may be estimated as to quantities and cost so that when opportunity does come a proper statement of investment, advantages and savings may be promptly presented without the delay of a survey and a study.

Going Dry

WE MUCH regret that the report of the Safety Committee of the Rocky Mountain Coal Mining Institute spoke a word for humidification and sprinkling. We expect the West to lead in rock dust, first because it has a plentitude of that commodity and secondly because it has a shortage of water. Winton, Wyo., that has led the West in rock dusting may be shorter of water than other mining villages but surely many others are not far behind.

Why then should the West cling to humidification, except at the working faces and for laying the dust on cars, loaded and unloaded? As for sprinkling, it is hopeless in a dry climate. We believe in immersion rather than in sprinkling, but where is the water that will keep a Utah or a Wyoming mine properly immersed?

Because, however, there are some who still may want to use sprinkler cars, despite their undoubted disad-

vantages and because we shall probably continue to use water in rooms as a way of attacking explosions a little nearer the source than is possible where headings only are sprinkled, one of these devices is portrayed this week in "Problems of Underground Management." Sprinkling pipes carried to the face have the advantage that they can be used at any time. The sprinkler car has much to commend it, especially the breadth, length and elevation of its application of water and the fact that its use is not likely to be slighted by the man who should do the sprinkling, but it does not have the merit, except when shotfirers are employed, of performing its work near the time of maximum peril, which is when the place is being operated and shots are being fired. If the cutter-bars are to be sprinkled, the pipes will be on hand for a general sprinkling of the face, and also of the room gob and in that event the sprinkler car will have a difficult time justifying its existence. Times change rapidly. A few months ago everyone was looking for a sprinkler car, and now the nation has gone dry.

Let Politicians Beware

POLITICAL activity has made Great Britain examine her industries with care. They have been found wanting, of course. They do not work steadily. They do not give the workman all that he needs. Hence the politicians have been able to indict industry quite satisfactorily.

Now the politicians are asked to reform industry and if they cannot reform it, to take it over and operate the factories, the mines and the mills better than the corporations are doing. This is a hard problem for politicians to solve. They are proving even less successful than the industrialists and the result is the people are ill satisfied. The argument, "If you don't like the way it is done, do it yourself" is disconcerting if the man who is asked to do it doesn't know how. The politicians will try anything once. But they will find they are face to face with a problem they cannot solve.

The working men are not satisfied with the solution proposed in the "Coal and Power" report of the Liberal party, of which we published a happily worded description by George Otis Smith last week. It does not rest satisfied with reasonable royalties, it wants no royalties whatever. Both profits and royalties are taboo as also the closing down by a uniform wage scale of inefficient mines. It must be remembered that workmen will have to move or be idle who have been working at naturally difficult operations if such mines are put out of business. So the report, radical as it is, will satisfy no one. The politicians have stirred up a ghost that they cannot down.

Though it is a fundamental tenet that government is for the people and not the people for the government yet at the same time that doctrine has so often made a dependent and weakling democracy and the opposing tenet strong and progressive nations, that it would seem better to beware of accepting in too full a sense the conviction that the purpose of government is to coddle and mother the individual, but rather to keep steadily in the forefront the idea, ridiculous as it may seem, that the purpose of government is to establish an ideal to which the individual can render a perpetual service.

The Worst Industry

MANY a perfectly good fact has been ruined by a carelessly appended superlative, and perhaps it would not be well to suggest that there is any worst industry among the many that might run close for that unenviable distinction. Still, if we had to award the booby prize it would probably go to the constructors of houses, water-works, roads and railroads rather than to the coal men on whom this discredit is usually pinned.

No industry works more irregularly than that of construction as we have often pointed out. None houses its men in more insanitary, overcrowded and impermanent hovels when housing has to be provided. Men are herded into box cars, lodged in adobe huts or thrust into long bunk shanties with little or no consideration as to health, comfort or morals. Justice compels us to admit that these conditions had some excuse and that recent years have shown much improvement in the building of construction camps.

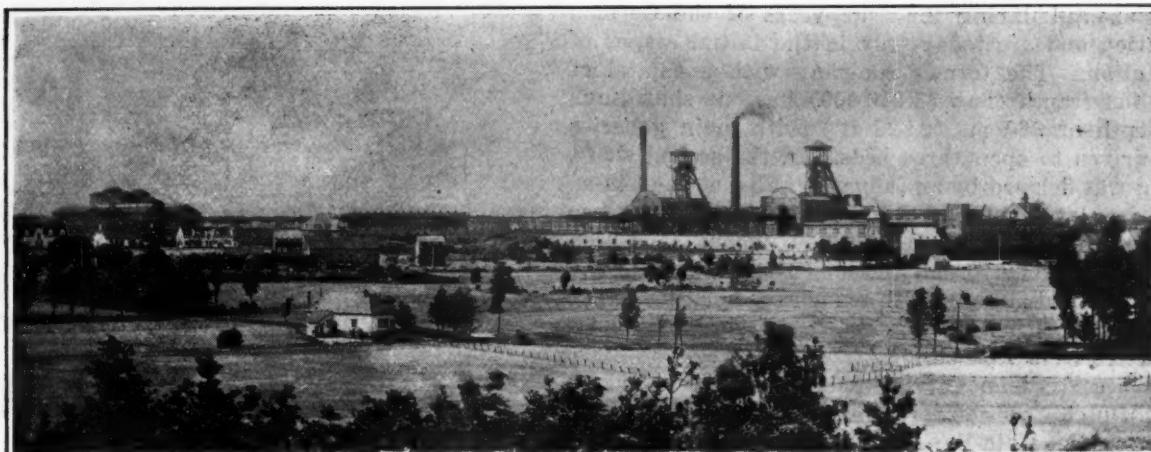
One might add, if one had statistics to ascertain it, that none has a higher record for accident. Few workmen have been guilty of more violence than the iron workers. Few have had more stringent rules against large output and efficiency than the construction unions, and this industry is almost the only one that has jurisdictional strikes. The construction industry, if not the worst, is so near that goal that you will not need to travel further when it is reached.

Says a Committee of the President's Conference on Unemployment, "Building trades' workers in the average American city, it appears from information gathered in our survey, are employed at their trade less than three-fourths of their time. In the average year these men must be paid enough that they can support themselves and their families for twelve months on wages received for seven to ten months' work."

"For most contractors the overhead costs for maintaining their offices and staff during the whole period of twelve months must be charged against the jobs carried on actively during only seven or eight of those months. Supply dealers must maintain establishments big enough to handle a large quantity of work during four or five months. These establishments are practically idle during at least three months and are operating at only a fraction of their capacity during the rest of the year." And so on for building material manufacturers and architects. All this sounds like the indictments that have been and are being passed on the coal men. There is the old familiar ring. The judge's verdict is the same but another culprit stands disconcerted at the dock.

As for combinations in restraint of trade, the resemblance is not so close. The coal operators have been charged with violations of the Sherman Act but the allegation has never been proved. The material trades and the constructors, both only in part, have been accused, but in their instance the charge has been sustained.

We are not ready to condemn those faults which are almost unavoidable in the construction industry, but we cannot but be reassured by knowing that unemployment, excessive pay to counterbalance short time, bad housing, undue accident rates, violence in strikes, restricted output, insufficient ability to fill crying needs, excessive prices and costs with combinations in restraint of trade also are alleged of an industry that so far has escaped general condemnation. We would like to know why?



General View, Winterslag

Campine Region—A Coal Field with No Completed Shaft Less Than Two Thousand Feet Deep

Coal Discovered in 1901—Apparently Portion of Field Extending from England to Germany—
Coal of Excellent Quality Especially for Metallurgical Fuel—Longwall
Mining and Rope Haulage Adopted

BY D. ADAM*
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EARLY IN THE nineteenth century geologists speculated on the possibility of finding, under the Secondary and Tertiary formations of Northern Belgium, a concealed coal basin linking the Westphalian field with that of the English Midlands. It was not, however, until 1876 that the theory took definite shape in the writings of Guillaume Lambert, then professor of geology in the University of Louvain. The theory was still more strongly advocated by his pupil André Dumont, son of the celebrated Belgian geologist. In 1901 Dumont obtained verification of his beliefs from a borehole that he and his associates in a prospecting company put down near the little village of Asch.

News of the discovery of coal below the moors and sand dunes of the Campine created a profound sensation in Belgium, and during the following three years over sixty boreholes were sunk by various prospecting parties. Although in many cases too hastily drilled to give exact information about the overburden, these boreholes served to indicate approximately the northern and southern boundaries of the basin and to confirm the hopes raised by the first discovery. But they showed also that there existed a formidable obstacle to commercial exploitation in the overlying strata which consist in large part of running sand and clay, extending to depths of 500 to 600 m. (1,640 to 1,968 ft.). It became evident that shaft sinking would require a far greater capital outlay than had been usual in the southern field and that mining operations would have

to be conducted on a big scale in order to provide for the redemption of this investment.

Fortunately the Campine basin proved to be rich in coal of a quality that hitherto had been lacking in Belgium. The gas and coking fuels of the upper measures had not been denuded as in the regions of Liège, Charleroi and Mons, and in themselves were sufficient to attract the capital necessary for their exploitation. Much of this capital came from iron and steel manufacturers in France and Belgium who were interested, not only in the profit derivable from mining operations, but in opening up a source of coking coal that would make them independent of foreign supplies.

SEVEN COAL COMPANIES START OPERATIONS

In 1906 eight concessions were granted, this number being increased later to nine. Today seven operating companies are working on these concessions. The most advanced of these from the point of view of exploitation is the Charbonnages de Winterslag with an output of 2,500 to 3,000 metric tons per day (2,755 to 3,306 net tons) and equipped to handle an output of 4,000 metric tons (4,408 net tons) when sufficient faces have been developed. Its subscribed capital consists of 12,000 shares (of no par value), 26 million francs (now \$1,310,000) in 4½ per cent bonds and 34 million francs (now \$1,715,300) in 6½ per cent bonds. On the balance sheet presented in June last the concession and plant were valued at 75 million francs (now \$3,783,750). For the financial year ended March 31, 1924, the shareholders received a dividend of 300 francs (now \$15.04) per share, the first since exploitation proper began in October, 1917.

Adjoining Winterslag on the north is the concession

*University of Glasgow.

Note.—At the Winterslag colliery shown in the headpiece, cars are moved from the shaft at the right to the screening and washing plant on the left over an elevated trestle by means of an endless chain. The mine offices, bathhouse, lamproom, etc., may be seen on the right, some of the mine dwellings appearing in the foreground.

of Charbonnages Liegeois and on the east that of Charbonnages André Dumont. Both these were practically at a standstill during the four years of the German occupation and are today only in the initial stages of exploitation. The former company with a capital of 80 million francs (now \$4,036,000) has one shaft sunk to a depth of 860 m. (2,822 ft.) with main galleries being driven to open three beds. In the second shaft, sinking was delayed by an influx of water at the 340-m. (1,115-ft.) level but has now been resumed. The two shafts of the Charbonnages André Dumont have been sunk to depths of 710 and 700 m. (2,329 and 2,297 ft.) respectively and already, with temporary hoisting equipment, a small output is being obtained from the development entries.

At the eastern end of the field, with one boundary on the Dutch frontier, are the concessions Guillaume Lambert and Sainte-Barbe, belonging to the Charbonnages Limbourg-Meuse. This company with a capital of 75 million francs (now \$3,783,750) has already reached the production stage, though still far short of its calculated normal output. At the present time exploitation is concentrated chiefly in three beds at depths ranging between 600 and 700 m. (1,969 and 2,297 ft.). At the opposite end of the field is the concession of the Charbonnages de Beeringen (capital 75 million francs, now \$3,783,750) which, after Winterslag, is the most advanced of the Campine collieries. For the first quarter of 1924 it had an output of 64,000 metric tons (70,528 net tons).

The sixth operating company, Charbonnages de Helchteren et Zolder, with concessions adjoining Beeringen on the west, is still engaged in shaft sinking. One shaft entered the coal measures in June, 1923, at a depth of 700 m. (2,297 ft.) and the other is expected to reach the coal measures in September or October of this year. Another operating company, La Société de Houthaelen, was formed at Brussels in July, 1923, with a capital of 35 million francs (now \$1,765,750). It is at present only at the stage of prospecting its concession.

Though much remains obscure in the geology of the Campine field, sufficient development has been performed to indicate its general structure and its relationship to the great Anglo-German basin. The known



Fig. 1—Location of the Campine Field

This field is apparently a portion of the great coal basin that stretches from Ireland to Germany or possibly even into Russia. Although coal was long believed to exist in the Campine it was not until 1901 that a borehole proved its location.

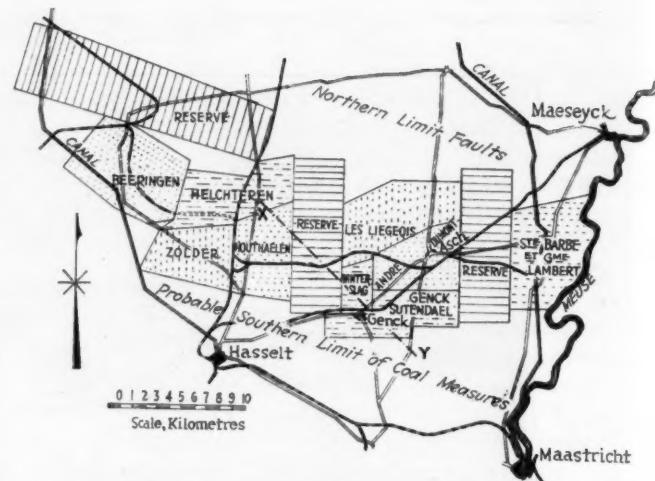


Fig. 2—Detail of the Concessions Granted

Eight mining areas or concessions have been granted and three reserve areas are held by the state. In some concessions production has started, but the others are as yet in little more than the prospecting stage.

facts hitherto scattered through many different publications have been summarized recently by Professor Stanier*, who, as consultant geologist, has taken an important part in the prospecting work.

It is now established that the Campine basin is a portion of the long field starting in Westphalia and traversing the province of Limburg in Holland, the Campine, Province of Antwerp, Zeeland, the North Sea and the Midlands of England. It was apparently protected from denudation and from the folding which has greatly disturbed the Liège-Charleroi-Mons basin by the vast Siluro-Cambrian anticline of South Wales and Brabant. It has been affected, however, by a complicated system of faults. One set of these appears to dislocate only the coal measures.

CROSS FAULTS DIVIDE FIELD IN COMPARTMENTS

The general direction of this first set of faults is north-west to south-east, but there are also cross faults at right angles with it which divide the coal measures into a series of box-like compartments. The second set of faults limits the basin on the north and probably also on the south. The northern faults affect the strata from the coal measures to the Quaternary gravel and have been compared by Professor Stanier to a gigantic staircase, displacing the coal measures to a depth of more than 2,000 m. (6,562 ft.) below the Tertiary rocks of the Fosse de Ruremonde, a depression well known to Dutch geologists who have approached it from the other side.

Their position along the southern boundary of the field remains obscure, for no boreholes have been continued beyond the carboniferous limestone at the base of the coal measures. It appears probable, however, that the Campine basin is completely detached from the Liège basin by the Siluro-Cambrian anticline of Brabant. On the east there is connection with the coal measures of Limburg in Holland and on the west with the unexplored basin of the province of Antwerp, which, for the time being, is retained as a government reserve.

The Campine coal measures belong to the Westphalian system and it is to the upper portion, in a band known as the Genck series, that development is at present confined. The prevailing dip is about 5 deg. in a north-

* "Résumé de Nos Connaissances sur la Géologie de la Campine," Annales des Mines de Belgique, 1924 t.XXV Ire. Livraison p. 163.

early direction, with the line of strike forming a curve. The faulting, however, to which reference already has been made, causes many local variations in dip and strike. The number and thickness of the beds encountered in the different shafts and boreholes also vary considerably. Some typical sections are shown in Fig. 3.

A calculation made by Professor Denoël of Liège University gives the following figures for the reserves in the basin. These are based on the assumption that extraction can be carried to a depth of 1,500 m. or 4,921 ft.

	Millions of Cubic Meters
Gas coal	3,600
Coking coal	2,900
Semi-bituminous coal	400
Total	6,900

Assuming that the density of this coal is 1.25 and that a possible extraction of 75 per cent can be attained,

lining of the shaft with cast-iron tubing down to the top of the coal measures. In the earlier shafts the ground was frozen only to the Tertiary shales at a depth of about 340 m. (1,115 ft.), the intention being to use cement injections should further water-bearing beds be met. This plan, however, left out of account the Hervian Sand which swallowed cement, without any diminution of its flow or pressure.

In the end, freezing had to be resumed at the lower level and, as this is a difficult and costly operation, the later shafts were frozen all the way to the coal measures. The only shafts which escaped the Hervian Sand were those at Winterslag, where, by some fortunate chance, only the upper portion of this band was met. It was this good fortune that allowed Winterslag to get so far ahead of its neighbors, though they began sinking at the same time.

Before the sinking of these Campine shafts, the greatest depth to which freezing of the strata had been carried was 300 m. (984 ft.). To advance at one step

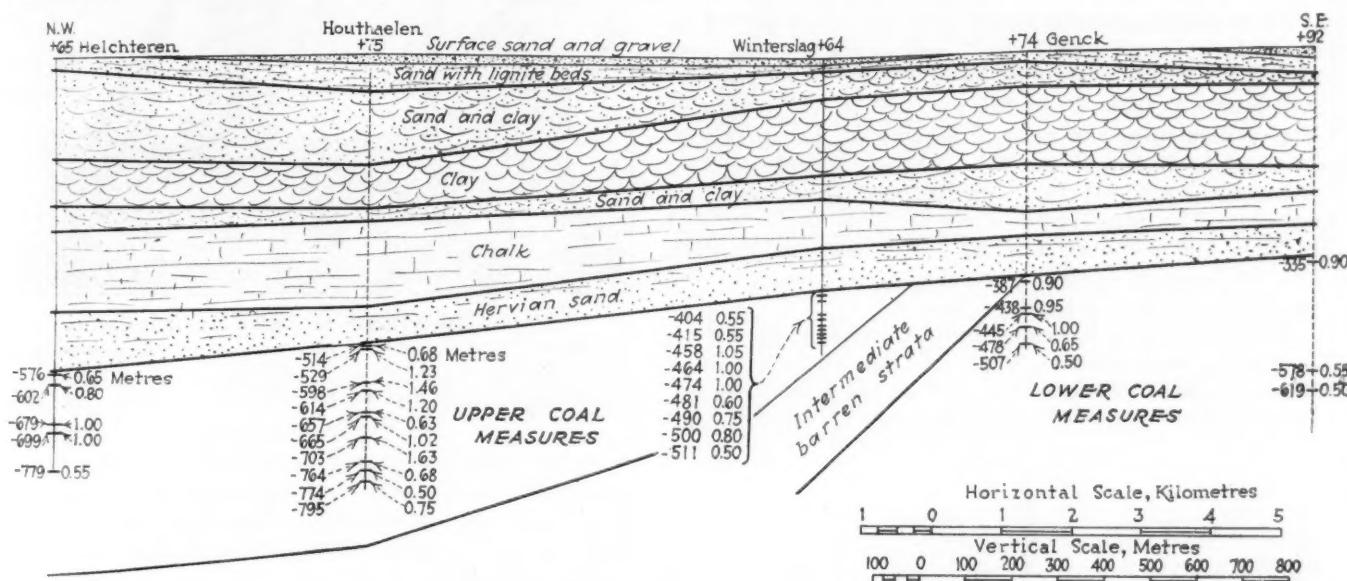


Fig. 3—Cross-Section of the Coal Measures Along Line XY of Fig. 2

Presence of the Hervian Sand which carries much water under high pressure makes shaft sinking difficult. This sand literally swallows cement without any appreciable effect. Consequently it was necessary to freeze the measures surrounding the shafts. Although this process is slow it has proved highly satisfactory, and shafts thus sunk when lined with cast iron are practically dry

there is a reserve on the basis of Professor Denoël's figures of more than 6,000 million metric tons (6,612 million net tons) in this field. If mining were limited to a depth of 1,000 m. (3,281 ft.) the quantity would be about 4,000 million metric tons or 4,408 million net tons.

All formations subsequent to the Carboniferous are represented in the strata overlying the coal measures of the Campine, though it is only to the north in the Fosse de Ruremonde that the complete sequence is found. At the top of the coal measures now being worked there appears to be an unconformable junction with an upper band of the Cretaceous, known locally as the Hervian Sand. This is of evil repute in the Campine, for, though in its upper layers it consists of a sandy chalk or marl, at the base it becomes nearly pure sand, heavily watered and offering a formidable obstacle to sinking operations. Above this Hervian Sand there is an exceptionally complete sequence of Tertiary strata to the Quaternary gravel and sand of the surface.

In all the shafts sunk in the Campine it has been necessary to use the freezing process, followed by the

to a depth of 600 m. (1,968 ft.) was a great achievement in engineering for which credit must be given to the late Louis Sauvestre, who had charge of the sinking at Beeringen and to the Foraky Boring & Shaft Sinking Co., Brussels, which drove the first three shafts to reach the coal measures and has since, either alone or in collaboration with other contractors, had a hand in sinking most of the Campine shafts.

Thanks to the experience thus gained, the sinking of shafts by the freezing process to depths of 600 to 700 m. (1,968 to 2,297 ft.) now can be undertaken with the same certainty and security as sinking by ordinary methods through dry rock strata. The work is naturally slower and more costly but results in as perfect a shaft as any that can be sunk in the most favorable ground. Notwithstanding the reservoir of high-pressure water encircling the shaft, the inflow, after the tubing is placed and the ice wall thawed, is insignificant.

So dry indeed are these shafts that in subsequent sinking through the coal-bearing strata the men employed frequently discard their customary garb of oil-

skins. In the producing mines the water inflow is small (at Winterslag 8.5 cu.m. or 2,245 gal. per day) and the workings are dry. The shafts are 5½ to 6 m. (18 ft. to 19 ft. 8 in.) in diameter and are divided into four winding compartments.

The resemblance of the Campine coal field to that of the English Midlands, with its flat regular beds, has led to development on the same general plan as that followed in the longwall workings of the English collieries. This plan, however, has been modified by ideas and habits transplanted from the Liège-Charleroi-Mons coal field. At Winterslag the bed is entered from the shafts by two parallel galleries. From these, two main entries are driven as nearly as possible to the rise, but at a gradient not exceeding 3 deg. Between them is carried a longwall face 100 m. (328 ft.) in length. One of the entries serves as an air intake and main haulage road and the other as a return airway.

OSCILLATING CONVEYORS USED AT THE FACE

From these passages lateral entries are projected on a straight bearing following approximately the level course or strike of the bed and between them are carried longwall faces 80 to 100 m. (262 to 328 ft.) long. Fig. 4 illustrates the general scheme of the workings. In practice it is not possible to keep strictly to this geometrical plan, as faults and other disturbances interfere. The aim, however, is to block out the coal in these 100-m. panels and, as far as the stratification and the limiting haulage gradients permit, to carry the panels forward on a straight bearing.

The coal mined is loaded into a mechanically driven oscillating conveyor which extends the whole length of the face and discharges into cars on the haulage entry. Here an endless rope brings the cars in trips to and

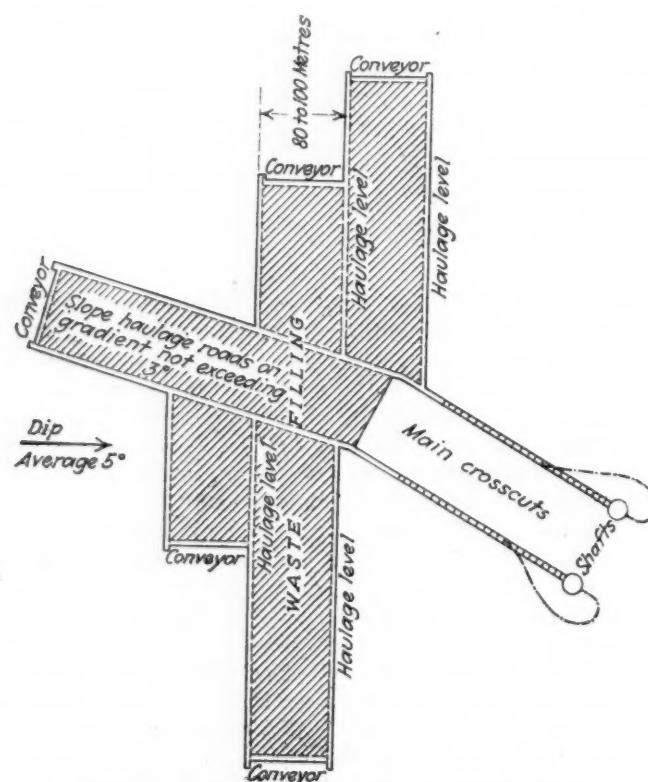


Fig. 4—Method of Working by Longwall Faces

Headings are driven so as to obtain an advantageous grade. Working faces are kept as nearly level as possible. Oscillating conveyors are used to move the coal to cars on the heading. Coal is broken down by means of drills, although experiments are being conducted with undercutters. This coal bed is about 40 in. thick.



Fig. 5—Headframes at André Dumont Colliery

European coal mines are built to endure. If a mine is expected to last for 200 years the headworks are constructed to last an equal length of time. Under such circumstances it is highly important to plan headframes and the like amply strong in the first place.

from the face. The coal is broken from the face by light jackhammer drills, no explosives or undercutting being required. Experiments, however, now are being made in the Campine field with various types of coal-cutting machines.

In a bed one meter (3 ft. 3½ in.) thick, eighteen men can break down and load into the conveyor, about 200 metric tons (220 net tons) of coal per shift of 8 hr., but this figure will probably be increased when transportation has been improved. Thus far the maintenance of haulage roads under the heavy roof pressure has proved a difficult problem at Winterslag, but it is hoped that relief will be secured as the face advances and the roof settles firmly on the waste filling.

Filling with waste is also a difficult problem for the mining engineers in the Campine. According to state regulations the workings must be completely stowed. In a longwall face, with an interval of 80 to 100 m. (262 to 328 ft.) between the roadways, the quantity of waste obtained in normal mining operations is insufficient to comply strictly with this regulation, and filling material must be brought in at considerable expense and inconvenience from some source outside the mine.

No doubt exemption from this regulation could be obtained, but, for the moment, the opinion prevails that complete stowing is necessary for safe working under the heavy roof pressure encountered. Hydraulic stowing has been suggested, but until the underground roadways are in a more stable condition, it would be risky to bring high-pressure pipe lines through them. Perhaps at some later date the orthodox longwall system, with side packs along the roadways and complete subsidence of the roof behind the face, will be tried.

If experience in British collieries can be taken as a guide this may ease the pressure on the roadways.

At Winterslag all underground transportation is by endless rope, the cars being attached in trips of forty or fifty. At some of the other collieries, however, it is proposed to use benzine (gasoline) locomotives. At one of the collieries in Holland, where conditions are similar to those in the Campine, a trial is being made with a storage-battery locomotive, and if its performance is

satisfactory the experiment is likely to be imitated. The chief obstacle to the use of storage-battery locomotives in the Campine is that in the initial stages of development the underground haulage roads are more or less unstable. The floor "creeps" a good deal, and it is difficult to maintain the tracks in proper alignment. Apart from this, however, the conditions seem to be ideal for battery locomotive haulage and it is quite possible that eventually this method of haulage will be adopted.

How Output of Room-Slabbing Mines May Be Controlled

While Slabbing Pillars, Record Tonnage Is Obtained—When Driving Rooms, Output Is Low—Methods That Keep Output Steady

BY CHARLES GOTTSCHALK
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EVER SINCE active interest in underground coal-loading appliances began, demand has grown for a type of machine that can load coal along a continuous face several hundred feet in length into a slowly moving trip of mine cars. The manufacturers have put forth every effort to meet this demand, and accordingly machines have been designed with swinging rear-end conveyors.

For various reasons, however, this has only partially solved the problem. The main outstanding difficulties encountered are the length of time required to develop the necessary modified-longwall faces, their comparatively short life, the control of the mine roof over wide worked-out areas and the need for a speedier means of developing room entries.

Many schemes have been proposed and tried with varying degrees of success. Some good layouts no doubt have been abandoned because of the immediate difficulties encountered. These resulted from attempting to control the roof in areas insufficiently large. Better results might have been obtained had perseverance been shown, for in that event a larger area would have been developed, thus providing more favorable conditions.

At the present time several operations are planning to increase production by driving rooms exceptionally long and then widening them out by successive slabbing cuts to a final width depending upon local roof conditions. This plan gives promise of affording a practical

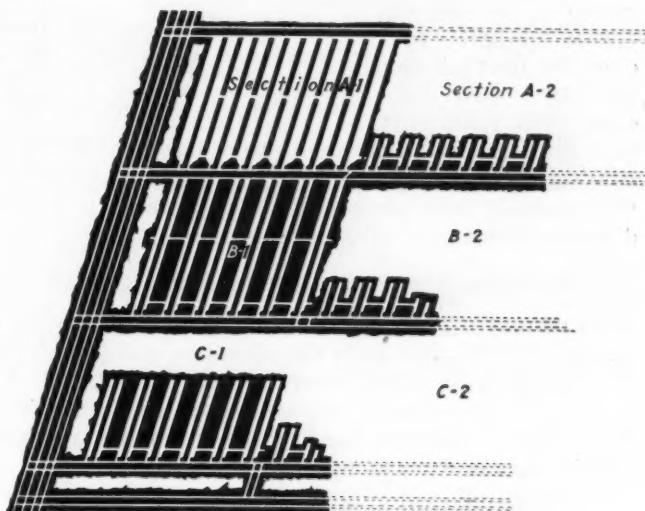


Fig. 1—Mine Layout Adapted to Slabbing

Slabbing has just been completed in section A-1 and the short rooms in section A-2 are in readiness for the three loaders that have worked out A-1. Slabbing in B-1 has just been started by the three machines that drove the rooms to completion. Development of rooms in B-2 is to be finished when slabbing in B-1 is completed. The rooms in section C-1 are in process of driving and will be ready to be slabbed when slabbing is finished in B-1. When C-1 has been slabbed out territory will have been developed ready for slabbing in A-2, and so on. Fig. 2 shows the schedule of operation and estimated tonnage.

means for increasing the output of loaders beyond what could be obtained under normal room-and-pillar methods.

Room slabbing has been successfully employed in hand loading with exceptionally high output per loader together with an excellent low-fatality record. It is certain that all mine roofs are not suited to this method of operation but where it can be adopted the management will do well to consider this plan and the advantages to be gained thereby.

One of the difficulties first encountered in projecting a mine on this basis is the fact that room driving is much slower than slabbing. Thus should the loaders

TABLE I—Results Obtained with Various Operating Conditions in Slabbing Mine.

Layout	1	2	3	4	5
Estimated tons per 8-hr. shift per loader in room driving.....	125	150	150	150	150
Estimated tons per 8-hr. shift per loader in room slabbing.....	250	300	300	300	300
Width of room before slabbing (coal 6 ft. high).....	22 ft.	22 ft.	22 ft.	22 ft.	22 ft.
Length of room beyond first room parting.....	450 ft.	450 ft.	450 ft.	450 ft.	450 ft.
Number of slabbing cuts from one side only of each room.....	3	3	4	5	6
Final width of rooms after slabbing.....	40 ft.	40 ft.	46 ft.	52 ft.	58 ft.
Final width of room pillar remaining.....	18 ft.	18 ft.	18 ft.	18 ft.	18 ft.
Required number of feet of room entry to develop one section.....	672 ft.	840 ft.	930 ft.	1,020 ft.	1,110 ft.
Required number of calendar days to develop one section.....	112 ft.	112 ft.	112 ft.	112 ft.	112 ft.
Number of 8-hr. shifts per day required on development.....	1	112 day shifts 28 night shifts	112 day shifts 43 night shifts	112 day shifts 58 night shifts	112 day shifts 73 night shifts
Number of days per section on room driving.....	75	75	75	75	75
Number of days per section on room slabbing.....	37	37	37	37	37
Length of slabbing area = length of room driven on development + room extension.....	520 ft.	520 ft.	520 ft.	520 ft.	520 ft.
Average daily output from sections A, B & C.....	1,500	1,800	2,100	2,400	2,700
Average daily output from each machine.....	166	200	210	218	225

Note: Production from entries not considered. Extra loaders in conditions Nos. 3, 4 and 5 to work continuously on slabbing being transferred progressively with slabbing operations.

In Layout No. 1 three mechanical leaders are employed in entry A, three in entry B and three in entry C; there being twelve rooms in each section. Nine leaders are provided for the three "room sections." In Layout No. 2 there are three mechanical loaders employed in entries A, B, and C respectively, as in Layout No. 1, but there are fifteen rooms in each section. As before there are nine leaders for three "room sections." In Layout No. 3 the conditions are the same as in Layout No. 2, except that the slabbing is performed one more time

than in the Layout No. 2 and one extra loader is provided for three room sections. In Layout No. 4, the conditions are as in Layout No. 2, but two more slab outs are made, that is, the slabbing is carried 12 ft. further. Two extra loaders are provided, so there are eleven loaders for three room sections. In Layout No. 5 again the conditions are as in Layout No. 2, but here 18 ft. more is slabbed off the pillar than in Layout No. 2; three extra loaders or twelve in all are used for the three room entries.

have twice the tonnage in slabbing that they have in room driving, the total output from a number of machines will vary from day to day according to the number of places available for the more advantageous loading. For example, a certain section might produce 500 tons per day for 20 consecutive days, then 1,000 tons per day for 10 days, then drop back to 500 tons again and repeat the cycle. This state of affairs if not balanced from some other source would be highly disconcerting to the sales organization.

UNIFORM STANDARD OUTPUT APPROXIMATED

To assume a probable case, it is possible to make a layout so as to anticipate the objection mentioned and standardize on a certain average daily output. If this is done, the transportation problem will be similar from day to day. Likewise, the average output per machine may be calculated in a more satisfactory manner.

In the accompanying figures, in the captions of which brief explanations have been incorporated, an attempt has been made to demonstrate at least one method of arriving at a concrete working plan that will bring about a constant daily tonnage where both room driving and room slabbing are employed.

Five different sets of conditions have been considered, as outlined in Table I, and the plan and equipment theoretically adjusted to each. No dimension, be it room width or length, has been assumed without considering its relation to the average capacity of the loaders and the thickness of the coal worked. Both these conditions will vary in different localities, but they must be determined accurately before the most advantageous layout can be planned. This is none the less true for hand loading.

Taking account of tonnage, the question of what a loader will do under various conditions and what this or that mine is getting from them are two distinct considerations. It has been amply demonstrated that machines are on the market that will load two tons of loose coal per minute, be it slack, run-of-mine, or lump. The quantity that machines are actually loading under practical working conditions in the mines is, generally speaking, the measure of the ability of the mine management to produce loose coal at the face and transportation to remove it therefrom.

CAN SHOOT COAL HEAVILY YET INEFFECTUALLY

The opinion has been expressed that in order to obtain satisfactory coal for mechanical loading it is necessary to resort to heavy blasting, thus increasing the percentage of fines. On the contrary, holes improperly placed and overcharged often result in a fall of coal which, although so shattered as to leave little if any lump, is so tightly wedged between the room ribs that a mechanical loader cannot economically dislodge it.

Accepting this fact then, that machines have been perfected capable of satisfactorily loading loose coal at the rate of several hundred tons per eight-hour shift,

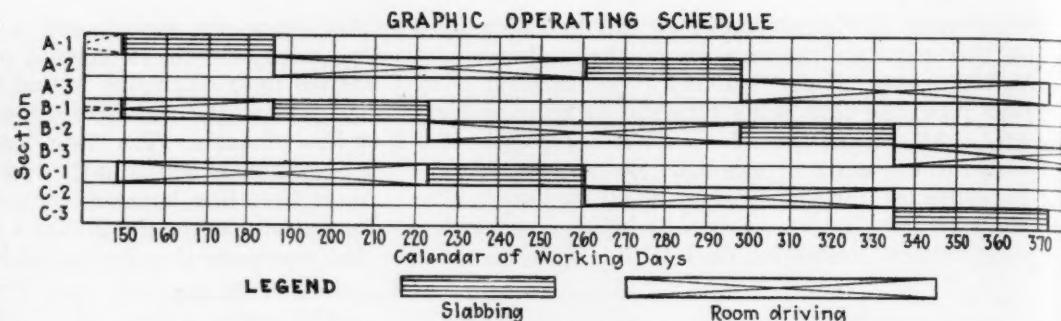


Fig. 2—Graphic Operating Schedule for Keeping Track of Slabbing Mine

By planning the slabbing cycle as illustrated the tonnage obtained in any day throughout the entire production period remains constant. Once a territory has been developed according to this plan,

there should be, under normal conditions, no interruption to or decline in output until arrival at the boundary of the assigned area. A practically uniform output is thus assured.

it certainly would appear logical to spend time and money commensurate with the possibilities involved to develop a mining process that will suitably prepare the coal for a light and portable loader, various types of which are already on the market.

What Shall We Do When Coal Is Gone?

At a session of the British Association for the advancement of Science held in Toronto, Ont., Prof. F. G. Donnan, of University College, London, said that when coal and oil are exhausted new forms of fuel will be obtained from common salt. Where water power exists near beds of salt (sodium chloride) the power will be turned into electricity and used to obtain chlorine from the salt, the chlorine gas to be transported to industrial centers for fuel.

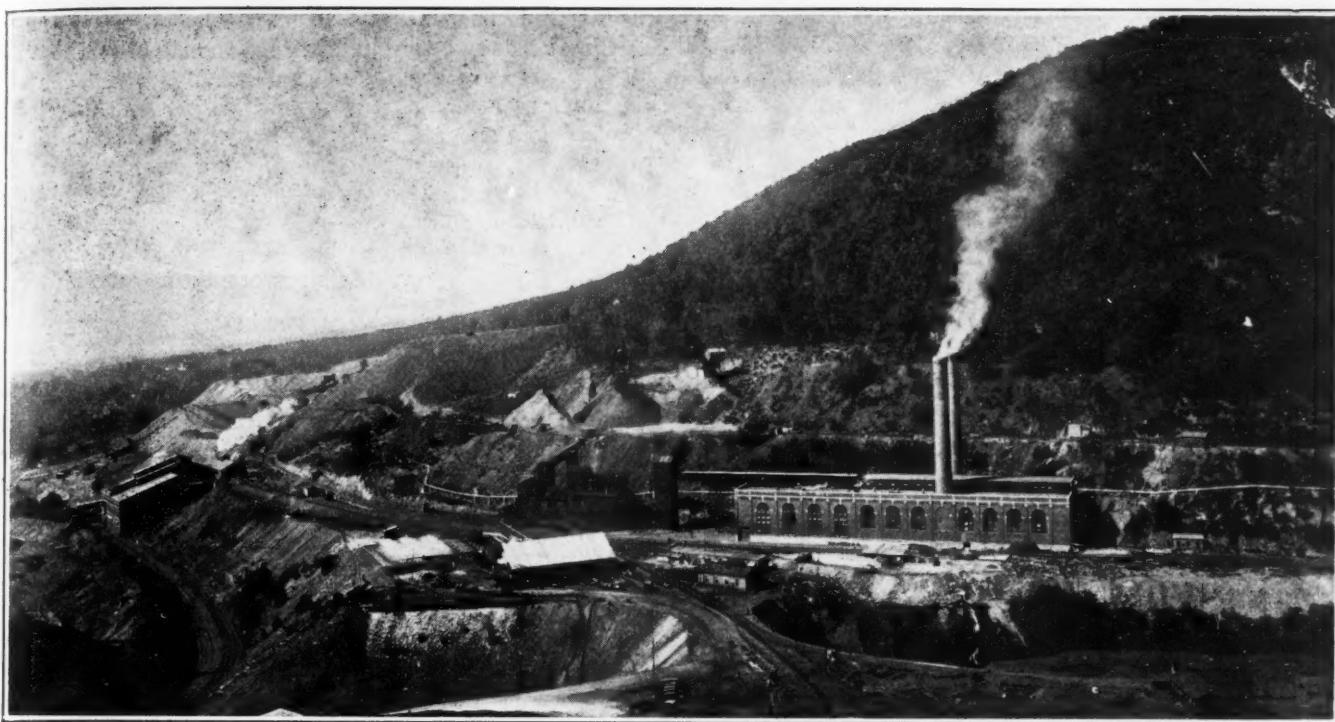
J. Alexander, a New York chemist, proposed the alternative solution that water-generated electricity should be used to break up water into hydrogen and oxygen, using both gases for heating, and perhaps also using the hydrogen in internal combustion engines. It was pointed out that millions of horsepower were going to waste because of difficulties of transmission which might be overcome by either of the two schemes suggested.

Neither suggestion seems as likely to be effective as the transmission of electricity in view of the expense of transporting gases even in pipes.

Utah Fuel Co. Makes No. 2 Mine Safe

On July 21 the Utah Fuel Co. reopened No. 2 Mine, where on March 8 a disastrous explosion occurred killing 171 men. B. W. Dyer, of the U. S. Bureau of Mines, with other experts made a thorough inspection before the reopening, reporting that an analysis of the return air showed 0.12 per cent of methane and a volume of 175,000 cu.ft. of air per minute. The mine liberates about 300,000 cu.ft. of methane every twenty-four hours. Every place in the mine is well ventilated. All working places and practically all places opened in the mine have pipe lines extended to the face so that every portion of the mine can be wetted down, and the places which are to be operated are equipped so that the men working there can keep their places wet.

Rock-dust barriers have been placed in right and left entries off the dips. Telephones are being installed throughout the mines. Company men will load and tamp all holes after the men are out of the mine and shots will be fired after everyone, shotfirers included, have reached the surface.



Power Plant of Susquehanna Collieries Co., Lykens, Pa.

Susquehanna Collieries Co. Burns Pulverized Anthracite Slush at Lykens, Pa.

One of the First Power Plants to Utilize Anthracite Slush in Pulverized Form—Coal Mixed with 75 per Cent Water Pumped to Plant—Boiler Plant Contains Six 5,000- and Six 6,000-Sq.Ft. Water-Tube Boilers—Present Generating Capacity 6,400 Kw.

THE successful application of pulverized coal in the firing of stationary boilers and the ability to burn in pulverized form practically any and all grades of coal with an approximately equal degree of thermal efficiency, have brought about the recent utilization of coal that heretofore had practically no market value.

Constituting a large percentage of this class of coal is the small-sized anthracite (smaller than No. 3 buckwheat) which up to a recent date was considered waste incident to anthracite mining and was in many cases allowed to be washed into nearby streams.

The accumulation of this fine coal has been going on many years until mountains of this material are piled around the collieries. The beds of the rivers and creeks are also lined with the material. The total quantity, probably running to nearly one hundred million tons, has washed down from the mining regions.

As all fine anthracite is referred to generally as culm, it might be well before going farther to point out the difference between culm and slush. A culm bank, as it is known in the mining region, contains all waste products from a colliery and consists of, depending upon its age, any coal that was rejected as unmarketable at the time, with slate, rock, breaker refuse and in the majority of cases ashes from the boiler plant. A slush bank consists entirely of coal relatively free from any rock or slate, but so fine as to be unmarketable; the fine reject from breaker or washery; a coal passing the smallest coal screens, sometimes called sludge and silt

from its condition when wet. Slush is being made at the present time from all breakers and washeries that are re-treating culm banks.

The new power plant of the Susquehanna Collieries Co. erected in 1920 and 1921 to supply current to its Short Mountain and Williamstown collieries, was the second commercial installation to use anthracite slush in powdered form, the first and smaller installation having been built by the same company at its Lytle colliery in 1918.

EXISTING PRACTICES WERE HIGHLY EXTRAVAGANT

At the time this plant was put into operation, the steam for operating the Short Mountain colliery was being supplied by three boiler plants with a total of nine water-tube boilers of 5,000 sq.ft. of heating surface and three locomotive-type boilers of 1,000 sq.ft. of heating surface. At the Williamstown colliery five boiler plants were in operation, containing a total of fourteen water-tube boilers of 5,000 sq.ft. of heating surface and three locomotive-type boilers of 750 sq.ft. of heating surface. The combined operating forces of these eight plants, including firemen, water tenders, ash men, coal passers, boiler cleaners, etc., totaled 154 men, and the coal consumption for the year 1917 amounted to 203,631 tons, the average boiler efficiency in these plants being around 35 to 40 per cent. The fuel burned was all commercial coal, about 90 per cent of which was No. 3 buckwheat and the remainder No. 2.

During the latter part of 1917 an exhaustive study

was made as to a means of reducing the power cost at the several collieries of the company, and this led to an investigation into the possibilities of burning anthracite slush in pulverized form in the new power plants which constituted part of the program of rehabilitation.

At this time the problem was discussed with the Fuller Engineering Co. and the mining company made an appropriation for an experimental plant consisting of a 2,500-sq.ft. Babcock and Wilcox boiler, a 42-in. screen-type pulverizing mill and a rotary drier that the mining company had on hand. This research work was continued from the latter part of 1918 to the end of 1920 under the supervision of R. M. Walker, consulting engineer of the mining company, with C. W. Lotz, combustion engineer, in direct charge of the work, and it might be stated that the ultimate success of burning pulverized anthracite is largely due to his work.

the fuel to ignition temperature after leaving the burner in the furnace proper, and also demonstrated the importance of introducing the coal into the furnace in the form of a narrow curtain, which method, it might be recalled, has since become more or less standard practice.

With these preliminary studies completed and the possibilities of a material saving in power costs assured, it was decided to adopt this method of firing in the new plants for which plans were already under way.

PUMPING SLUSH CHEAPER THAN CONVEYING

The slush, with a consistency of about 25 per cent coal and 75 per cent water, is pumped from the breaker and washery a distance of approximately 2,500 ft. and against a head of 400 ft., to a point on the side of the mountain adjacent to the power plant. It may appear

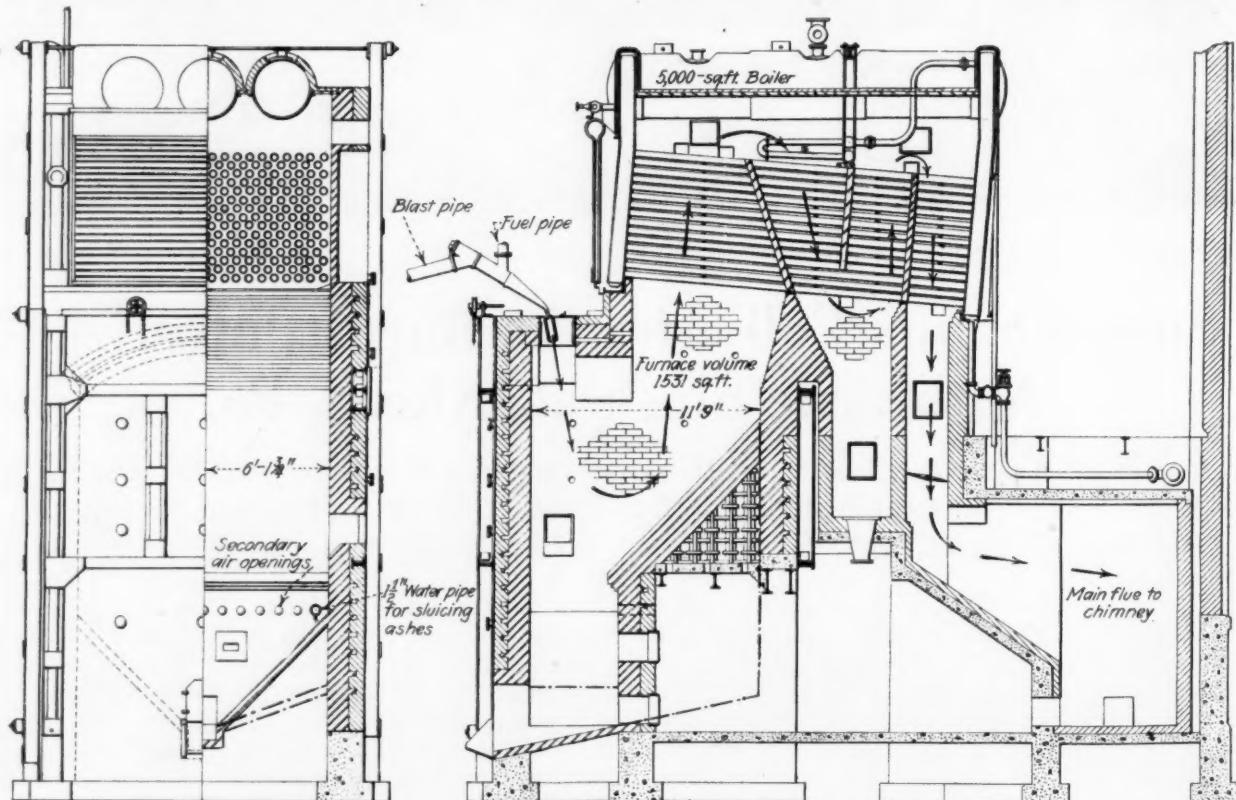


Fig. 5—Cross-Sectional View of Boiler, Furnace and Setting

The 45-deg. slagging shelf recently has been removed. Changes made in the combustion chamber are indicated by dot-and-dash lines. The boiler headers are approximately 13 ft. above the floor of the combustion chamber. Long narrow burners are located in the top of the front extension of the walls.

For this experimental work the combustion chamber was extended out in front of the boiler about 32 in., and was made the full width of the boiler and about 9 ft. deep, with approximately 13 ft. between the boiler headers and the combustion-chamber floor.

The first trial was made with a round-type burner located in the furnace front about 6 ft. from the bottom. As this resulted in heavy slagging and destruction of the ignition arch and brickwork of the rear wall, further experiments were made with several types of improvised burners located at different elevations in the furnace front, the final trial being conducted with a long, narrow burner constructed of sheet iron and placed in the top of the combustion-chamber extension. The secondary air in all cases was introduced through openings in the rear wall directly above the furnace bottom. These experiments showed that low-volatile fuels could be burned only in suspension by preheating

that much power is expended in pumping 3 lb. of water to each pound of coal over this distance, but as the slush leaves the breaker and washery with waste water, it was considered more economical to pump the water and slush to the plant and then dewater it than to convey the solid coal the same distance.

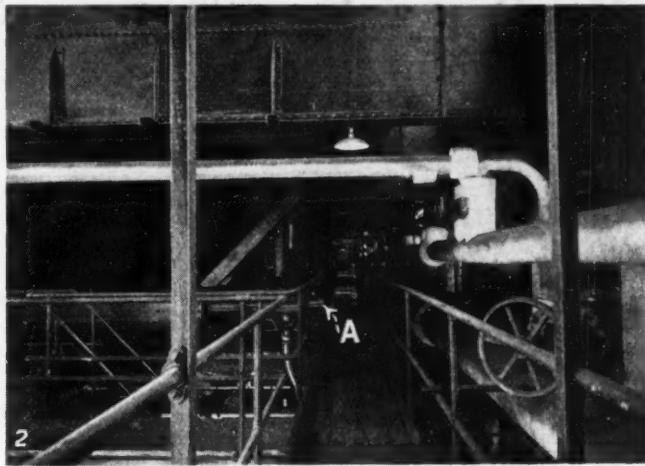
At the plant the coal is first discharged into two dewatering devices consisting of two concrete tanks and four slow-moving drag scrapers. The latter remove the coal from the tanks and discharge it directly to two coal stackers, one of which is shown in Fig. 3.

The stackers, each of which consists of a 90-ft. boom carrying a drag scraper, were developed in the consulting engineering department by E. B. Worthington, mechanical engineer, and provide a practical and economical means of storing coal.

The lower side of the trough in which the scraper carries the coal is fitted with a number of sliding gates,



1



2

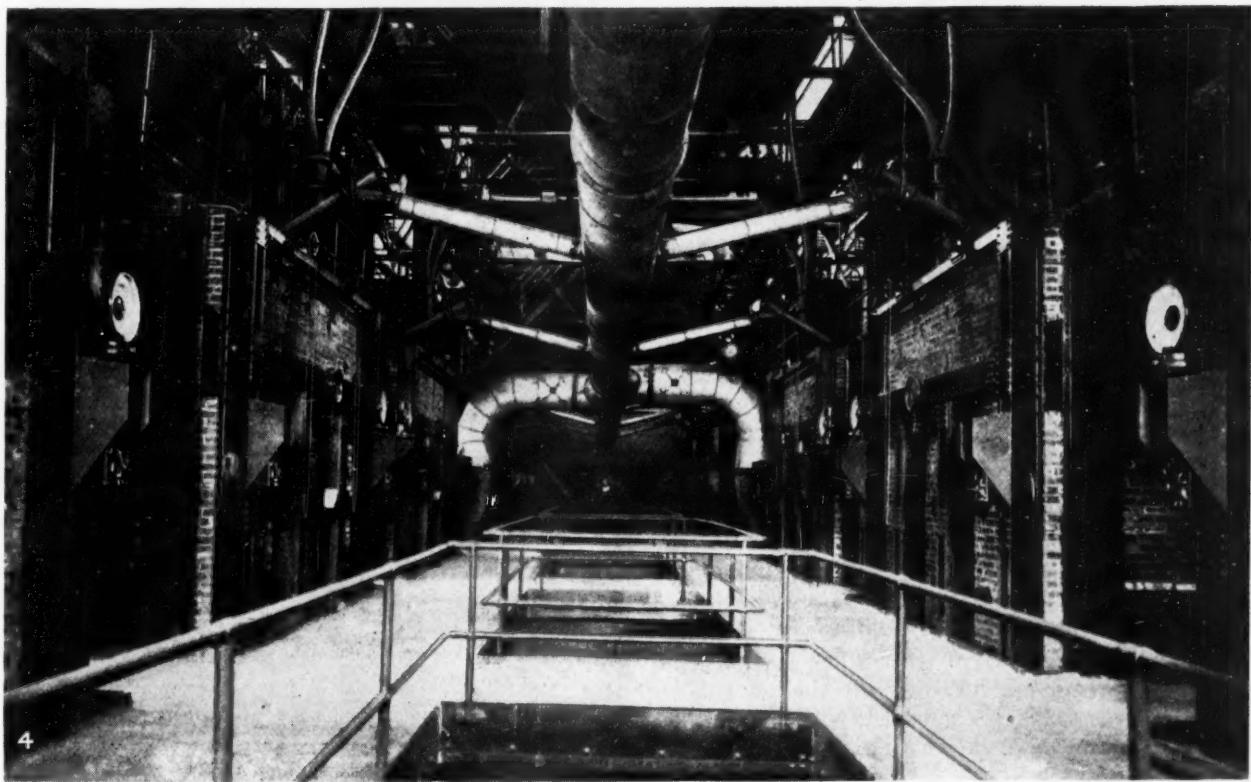
Fig. 1—Screw Conveyors Operating Over the Pulverized Coal Hoppers

Fig. 2—Coal Bunkers and Screw Feeders Above Operating Aisle



Fig. 3—One Unit of the Dewatering and Coal-Stacking Equipment

Fig. 4—Central Boiler Operating Aisle; Six Boilers on Each Side



4

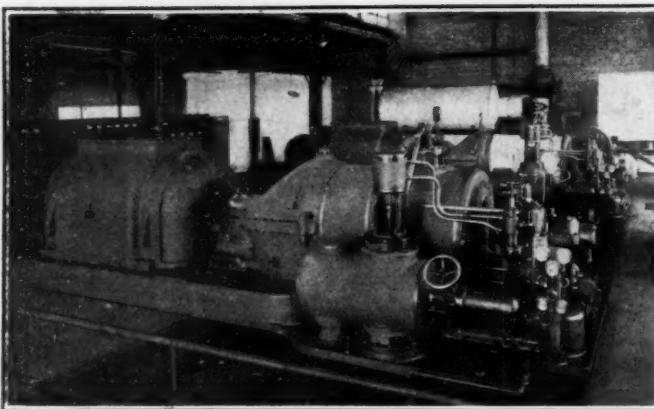


Fig. 6—Two 3,200-Kw. Turbine Units

The present generators consist of two units but sufficient space is available for a 7,500-kw. turbo-generator which will make this mine power plant one of the largest in the region and even larger than many public utility stations.

permitting the coal to be discharged at any point along the boom. The boom is arranged to swing through an angle of 180 deg., and this provides facilities for stacking approximately 100,000 tons with the two units in operation. The general arrangement of the dewatering and stacking and reclaiming equipment is shown diagrammatically in Fig. 9. Upon leaving the stacker the coal contains about 30 per cent moisture, but after standing in the pile for about 48 hours the moisture has decreased to around 10 per cent.

The reclaiming of the coal from the storage pile is accomplished by a scraper bucket operated from a motor-driven drum hoist, suitable anchor posts being arranged around the pile. The drum hoist is mounted on a turntable with a central discharge, and this feature permits swinging the drum in line to suit any position in which the scraper may be required to operate, the entire operation of dewatering, stacking and reclaiming the coal requiring the services of only two men.

From the discharge hopper of the drag scraper the coal is conveyed by a scraper-type conveyor to a distributing conveyor above the raw-coal bunkers in the pulverizing house. From the bunkers it is passed to two 25-ton per hour double-shell driers, hand-fired. Passing through the driers, the moisture in the coal is reduced to about one per cent.

EIGHT PULVERIZERS OF TWO TYPES EMPLOYED

The coal as discharged from the driers is elevated into a concrete dry-coal bin located over the pulverizing room and arranged with suitable discharges to eight 42-in. screen mills, four of which are belt driven from vertical motors and four geared-type direct connected to horizontal motors.

The screen test of the slush as fed to the mills runs about 70 per cent through a $\frac{1}{4}$ -in. screen, and the finished material leaving the mill runs about 82 per cent through a 200-mesh. It may be recalled that this is a much finer product than is generally considered necessary with bituminous coal. This fine grinding, however, appears necessary with anthracite slush in order to obtain proper ignition owing to the low volatile content of 8 per cent as compared with bituminous coals having 30 to 40 per cent volatile.

The mills discharge the pulverized coal into screw conveyors, which in turn feed into duplicate systems of bucket elevators which carry the coal to a point

above the boiler bunker level whence it is conveyed by duplicate screw conveyors to the fuel bins above the boiler aisle. As each conveyor is fitted with discharge chutes to each fuel bin, as shown in Fig. 1, one conveyor only is operated at a time, thus leaving one as a spare. The total capacity of the pulverized-fuel bins is approximately 250 tons, or a supply sufficient for a 24-hour full load of the station.

Referring to Fig. 4, the boilers are arranged in two rows, with six boilers on each side of the operating aisle. There are six 5,000-sq.ft. horizontal water-tube boilers equipped with superheaters and operated at 190 lb. pressure, and six 6,000-sq.ft. boilers of the same type without superheaters operating at 145 lb., all the boilers being designed for 200-lb. working pressure. The normal pressure of 195 lb. carried on six of the boilers was selected to suit the main generating units, and the pressure of 145 lb. carried on the remaining boilers was governed by the local colliery, in which there are two 48x72-in. hoisting engines and two 3,000-cu.ft. steam-driven air compressors and underground pumps. Provision has been made, however, for operating any of the boilers on either service by making the steam header in the form of two connected loops with sectionalizing valves between each boiler.

A cross-section of the furnace and boiler setting is shown in Fig. 5. The combustion chamber is extended out in front of the boiler sufficient for a good burner setting. It will be seen that the design of the combustion chambers is a departure from the usual practice. The floor of the chamber slopes at an angle of 45 deg. from the bridge wall to within 4 ft. of the front wall, the narrow portion at the front of the chamber serving as an ashpit. On the 5,000-sq.ft. boilers the furnace volume is 1,531 cu.ft., giving a ratio of square feet of heating surface per cubic foot of furnace volume of 3.26. On the 6,000-sq.ft. boilers this ratio is 3.76.

The ashes are removed from the pit by sluicing, the discharge from the mine pumps being used for this service. The bottom of the pit slopes from the side walls into a trough at the center. Water is led into the furnace at each side wall and flows down the inclined floor, carrying the ash with it. From the central trough the ash is washed out through a swinging door to a common duct below the central aisle and discharged into a suitable space outside the building. The sloping floor of the ashpit is grooved in order to reduce the water surface exposed to the radiant heat of the fur-

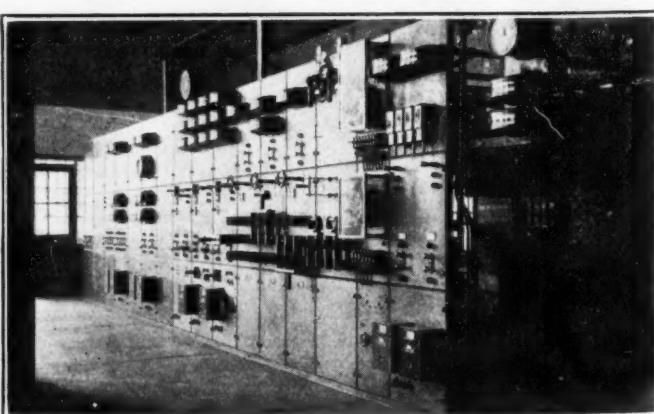


Fig. 7—Main Switchboard Controlling the Electrical Energy

This is located on the turbine-room floor and supplies power to the Short Mountain and Williamstown collieries.

nace. The heavy dot-and-dash line shown in the section Fig. 5 indicates the change recently made in the combustion chamber of one of the boilers, but at the time of writing no tests have been conducted to determine what improvement has been made in the efficiency of the boiler.

Each boiler is fired by one burner located in the arch forming the top of the combustion-chamber extension. The opening in each burner is approximately $2\frac{1}{2}$ in. wide by 5 ft. 2 in. in length. Each burner discharges directly against a hinged deflector (see Fig. 8), the position of which is controlled by a chain wheel and screw operated from the floor. In this way the flame travel can be adjusted to suit the load condition. Provision is also made in the cast-iron housing surrounding the burner for admitting secondary air, a damper being fitted to the top of the housing and operated from the floor.

SIX BOILERS IN A ROW SERVED BY ONE STACK

The feeders, two for each burner, are mounted directly below the pulverized-fuel bins with the controls conveniently located on the boiler fronts. The primary air is supplied by two motor-driven fans located between No. 3 and No. 4 boilers of each row and discharging midway into the primary air header, which is carried along the length of the boiler room directly above the operating aisle.

Each row of six boilers has a single stack with two breechings, the former in the center with three boilers on each side. The stacks are radial brick 12 ft. in diameter at the top and rise 175 ft. above the base.

The present installed turbo-generator capacity is 6,400 kw. in two units of 3,200 kw. each, provision being made in the station layout for an additional unit of 7,500 kw. The condensers are of the jet type and are mounted directly below the turbine exhaust, a spray pond being used for cooling the injection water.

The feed water to the boilers is supplied by three

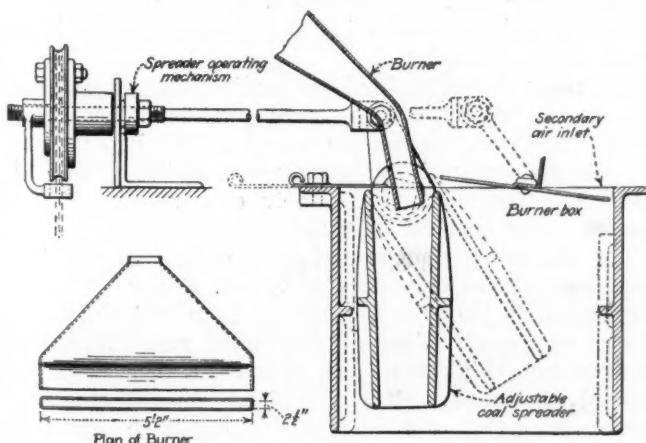


Fig. 8—Pulverized-Coal Burner and Spreader

Each burner discharges against a hinged deflector which permits the direction of the flame to be varied as the load changes. Secondary air may be admitted to the burner housing by means of a damper controlled from the floor.

centrifugal pumps, two of which are motor-driven and one steam-driven. The pumps are in the turbine-room basement directly below the feed-water heater. Exhaust steam for heating the feed water is supplied by the removal pump of each condenser and the discharge of the rado-jet air pumps. The exhaust of the two 3,000-cu.ft. air compressors at the colliery is also returned

to the plant, and any excess then is exhausted to the air.

The preparation plant is operated during the sixteen hours off-peak period that the collieries are idle. During this time sufficient coal is prepared for the twenty-four hour operating period of the station.

The cost of preparing and handling the coal at the Lykens plant averages about 60c. a ton over a twelve-

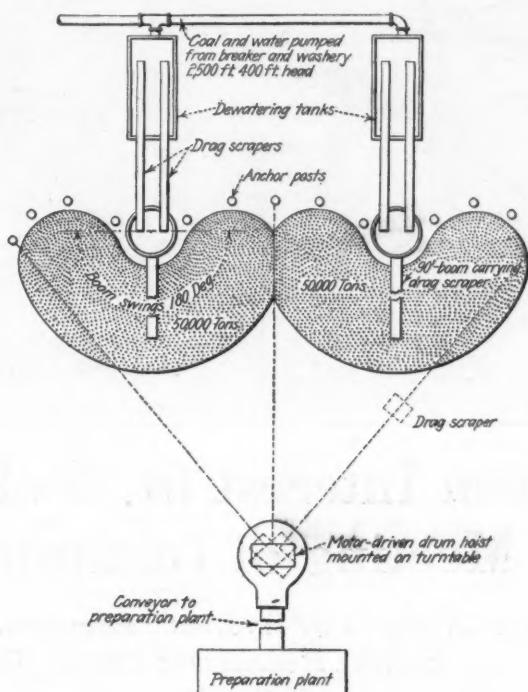


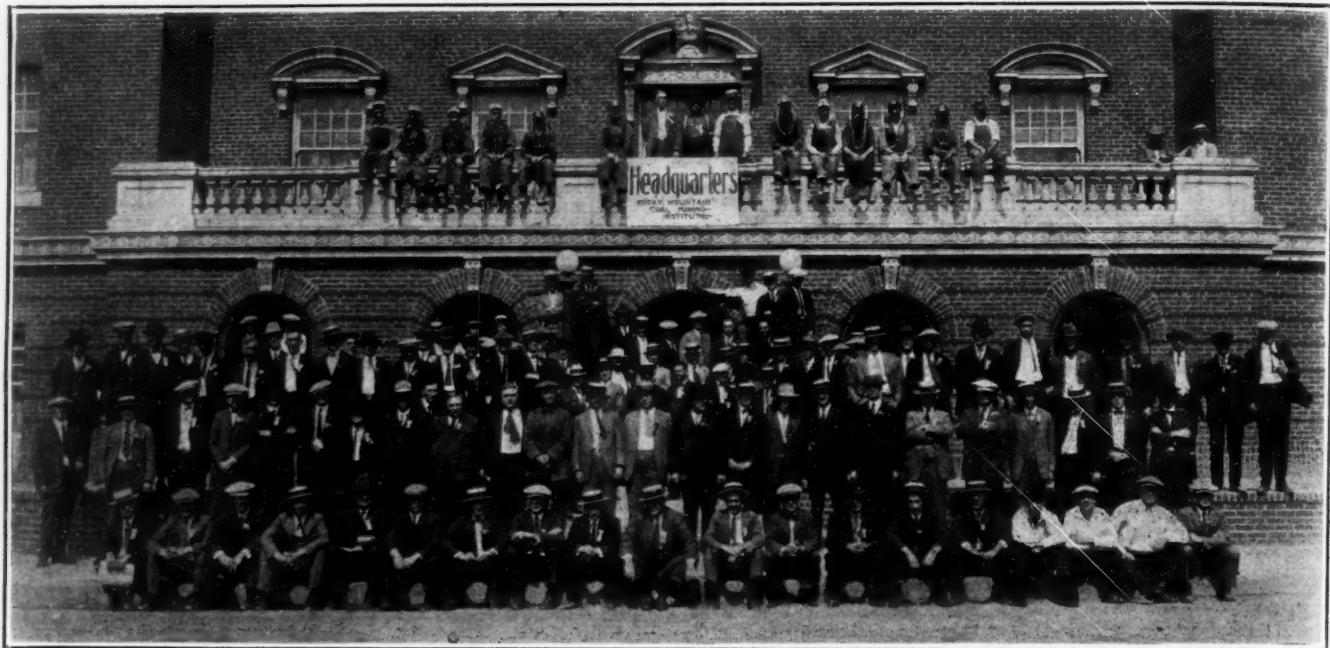
Fig. 9—Fuel Transporting and Dewatering Equipment

Water and slush from the breaker and washery is pumped into two concrete tanks from which the coal is removed by two coal stackers. From storage it is taken to the pulverizers.

month period. This includes operating and maintenance, labor and supplies, including power and superintendence, but not investment charges. The cost of pulverizing alone is about 24c. a ton.

The cost of preparing and handling the coal here given may at first appear high, but when it is remembered that the plant is being operated considerably below capacity, and that the cost of pulverizing and the maintenance charges on the mills increases rapidly with the degree of fineness of pulverization and the percentage of ash (the coal in this case is pulverized to a fineness of 82 per cent through a 200-mesh screen and contains 20 per cent ash) and that the pulverized coal is conveyed a distance of 500 ft. from the preparation plant to the bunkers above the boilers, this cost is not excessive.

The plant was designed and constructed under the direct supervision of R. S. Walker, consulting engineer of the M. A. Hanna Co. of Cleveland, which operates the Susquehanna Collieries Co., and his associates, A. J. Cayia, his assistant, E. B. Worthington, mechanical engineer, C. H. Matthews, electrical engineer, and C. W. Lotz, combustion engineer. Co-operating with these were H. L. Reese, electrical engineer, and W. E. Weinck, construction engineer, of the office of R. A. Quin, manager of the Susquehanna Collieries Co. at Wilkes-Barre, Pa., and E. A. Van Horn, superintendent of the Lykens Division of the same company. The plant is operated under the direction of H. B. Jones, chief station engineer. The H. C. Felver Co., of Cleveland, Ohio, constructed the plant.



Keen Interest in Mechanical Loaders Signalized Meeting of Institute at Rock Springs, Wyo.

Shovel Propelled by Hydraulic Ram with Frame Held to Its Work by Water Pressure Said to Have Remarkable Digging Qualities—Mine Fires and “Hush! Hush!” Policy Discussed—Committee Advocates Sprinkling!

NEXT TO ROCK dusting, mechanical loading methods and equipment elicited the principal attention of the members of the Rocky Mountain coal Mining Institute at their summer session, Aug. 7-9, in Rock Springs, Wyo.

Machine loading has reached a fairly high point of development at the Union Pacific mine at Hanna, Wyo. Superintendent T. H. Butler described the operation of Joy and Thew loaders in the 32-ft. seam of lignite at No. 4 mine. Joy machines load out the lower 8 ft. of this coal from 32-ft. rooms driven on the strike of the seam which pitches from 14 to 17 deg. Eighteen feet of the remaining 24 ft. are shot down and loaded out by the Thews. The Thews are operated by one man on the machine and two trimmers. Four men are used with each Joy, because the large lumps have to be broken and the tight coal has to be pulled down. Fewer men than this would greatly reduce the tonnage. The Thews are averaging 240 tons a day and the Joys 104 tons.

Mr. McAuliffe, president of the company, supplementing Mr. Butler's paper, said the Thews are money makers for the company, loading coal for 52.4c. per ton, which is a saving of about 30c. a ton. The Joys load at a cost of 72c., which is a saving of 11c. He said the Joys helped to make the Thews good earners for the company.

At the Reliance No. 1 mine of the company two Joy machines working in rooms on fairly steep pitches are able to average only about 72 tons daily, but in spite of handicaps they are cutting at least 1c. a ton from

the cost of loading. The institute visited this mine and saw these machines work.

Mr. McAuliffe took a rap at the institute members for not being franker and more liberal with the whole truth of every subject discussed. He said his company is perfectly willing to tell anybody anything about Union Pacific practice that will help them in coal-mine operation and he hoped other members of the institute would do the same thing.

Secretary Benedict Shubart replied that machinery men in the institute were “sales engineers” not “peddlers” and cannot in decency tell what they know about the results attained by mining companies. He said the companies must reveal their own results, if the mining public is to be informed.

The discussion then veered to the question whether loading machines increase slack. Mr. Butler said that the Union Pacific Coal Co. did not keep such data, for all the company's mines produce mine run. However, he does not think the slack proportion has been increased at Hanna. C. M. Goddard, representing the Joy Machine Co., said it is the shooting of the coal and not the machine itself that increases slack.

The coming of loading machines is going to produce at least one important change in mine operation, said T. H. Stroup, Superintendent of the Clear Creek mine of the Utah Fuel Co. It will make the operator take full responsibility for what takes place at the face, and at that point, he said, is to be found the heart of most mining problems. Heretofore, he remarked, there has been too great a tendency to blame everything at the face upon the miner.

In coal mines he thinks about 75 per cent of the men have been attaining only about 50 per cent efficiency,

NOTE—Headpiece shows Rocky Mountain Coal Mining Institute presenting solid front to photographer at Rock Springs, Wyo. A previous article on the meeting of the institute appeared Aug. 14 on pp. 227-229 entitled “Rocky Mountain Men Strike New Note in Dusting.”

for that very reason. Coal could take a leaf from the book of metal mining in this particular, for there Mr. Stroup has observed much closer attention paid by the company to face operations. As a result, loading at some big metal mines costs only 16c. a ton, yet loaders are happy, for they are making \$35 a week. They are kept busy, and their tonnages are high. Regular periods of rest are provided but the mines are operated so systematically that loaders lose no time needlessly.

Adaptation of loading machines to present systems of mining and not a radical revolution of methods to fit machines, is what S. W. Farnham, chief engineer of the Goodman Manufacturing Co., looks forward to as he scans what appears to be the future of underground loading. He told the institute that the famous V-system and some other efforts to attain tremendous tonnages do not look good to him because of the difficulty which must be met in cleaning such volumes of coal.

His idea of the proper loading machine is either a machine that merely loads and must have all its digging and loosening of coal done for it, or else a big strong digging machine which actually will tear loose tight coal thus producing more big lumps with less shooting. Any machine in the middle ground between these two extremes, will fail he thinks. The fact that so many mining men appear to expect digging of middle-ground machines is one reason why many machines that are already in the field have been scrapped.

Mr. Farnham holds that mechanical loaders cannot replace hand labor. Even hand loaders seldom actually load coal over half their working time. The rest of the time is devoted to track work, loosening tight coal, trimming cars and a score of other activities. He cannot see how loading machines ever can be expected to load all the time.

For that reason he does not believe that machine pay ultimately will be on a day basis as it is now in most of those states using machines. When it is on a tonnage basis, the time consumed in work around the machine will be less and the machine will load its maximum tonnage. During these days of experimentation with machines, however, he recognizes that daily wages may be best because tonnage scales fixed now might be extravagant for the machines which eventually may be developed. Scales once established in union fields are hard to change.

He reported to the institute that, after visiting most of the loading operations in the country, he estimated that the average tonnage being loaded by machines is about 70 tons daily and that the greatest limiting factors are breakdowns and the difficulty of getting cars to and from the machines.

Reverting to the V-system, he said the disadvantages were high cost of installation, difficulty of moving the equipment, danger of crushing at the face, the necessity of changing the whole system of mining, the difficulty of hand loading large lumps into conveyors and the need for extensive supervision.

Mr. Farnham described to the institute the new Goodman shoveling machine and showed pictures of it. The machine is about to be put on the market after extensive trials in a salt mine in New York state. It loads with a large shovel propelled by a hydraulic ram. This shovel, which is operated from a revolving turret, discharges coal gently into cars by the forward propulsion of the rear wall of the shovel. The machine is prevented from sliding backward by a hydraulic prop which is readily adjusted against roof and floor. It requires 6 ft. of headroom.

Charles Gottschalk, of Evansville, Ind., described what Indiana had learned about mechanical loading where a number of companies have been working various types of machines. One of his conclusions was that, until loading machines attain high daily tonnages, the problem of getting cars up and away from the machine is much less of a factor in production than that of proper shooting.

Mine fires give much trouble at the Reliance mines of the Union Pacific Coal Co. Superintendent Thomas Foster described various methods that have been used to check them. In one fire zone an effort to load out the fire failed, so sand packs were tried. They were built of timbers and boards behind which was left a space of 2 or 3 ft.

between the wooden wall and the coal rib. This method gave good results except that the sand tended to settle and had to be watched at the top.

The same method is being used to check another fire which previously burned across entries in the top coal and otherwise insisted upon spreading. Water poured through holes drilled in from the surface was of no avail for, when the water struck the hot rock over the burning coal, the rock turned to mud and choked the hole. The top coal is now taken down in entries which the fire is approaching, and sand packs are built to the cap rock. Fires in the Reliance mines from 1915 to 1924 cost \$118,681 or a shade over 3c. per ton of output. George Brown of Cumberland, Wyo., who has been battling bumps in the Union Pacific mines at that place since 1918, recited some of his experiences.

Eugene McAuliffe, president of the Union Pacific Coal Co., appealed to the mining fraternity to know more and guess less in the business of operating mines. He thinks there is altogether too much rule-of-thumb practice and too many men are bound by precedent and custom. Many mining men are satisfied with their ventilation if they think they have the right size and type of fan, the proper air input and water gage. But do they know definitely that enough air reaches the face? Mr. McAuliffe doubts if they do.

He questions whether they maintain ventilation maps of their workings and keep definite records of air delivered to the active spots in the mines. He doubts also if the average mining man realizes that if one per cent gas content is shown in an analysis of the return air from a mine supplied with 100,000 cu.ft. of air per minute, the total gas generated in that mine daily is no less than 32.47 tons. This may be harmless enough

McAULIFFE ADVOCATES LESS SECRECY

THOUGH the Union Pacific Coal Co. under Mr. McAuliffe's leadership and that of his predecessors has made great strides in the adoption of new methods, he believes the mining public should receive the full benefit of the results of all the pioneer work done in those mines and elsewhere and calls for more frankness in describing operating results, that industry may progress and every one may be benefitted. The Union Pacific Coal Co. at the Rock Springs meeting gave much information regarding its practices in mine fires and machine operation.

when diluted in the proportion of one to 99 with air, but who knows positively that his ventilation system is adequate at all parts of the mine to make that dilution? Proven facts is what Mr. McAuliffe thinks the coal industry needs, and he appealed to the institute for closer adherence to them.

COMMITTEE NOT ORTHODOX ON DRY ISSUE

The institute adopted without debate the report of the institute's safety committee, over which there was some hot argument at the winter meeting in Denver. The report condemned shooting off the solid, opposed the use of black powder in any mine where coal is cut or sheared and urged that no shooting be done when men are in the mines. It favored electric safety lamps in every mine that shows gas. It advocated careful use of water on cutter bars, better protection of bare wires and electrical equipment. It charges "at least 25 per cent of present-day explosions" to electricity.

The report proposes a long list of methods and devices for making ventilation more thorough and dependable.

To reduce dust it suggests that under certain conditions longwall be used instead of room-and-pillar mining, advocates more shot holes and lighter charges and that water be sprinkled regularly on roadways and on loaded cars. It recognizes the value of humidification of intake air by steam but does not insist upon its general adoption because of the expense accompanying the introduction and operation of such installations.

The report advocates rock dusting in mines having dangerous dust or both dust and methane. It opposes the installation underground of any electrical equipment or apparatus that is not approved by the Bureau of Mines.

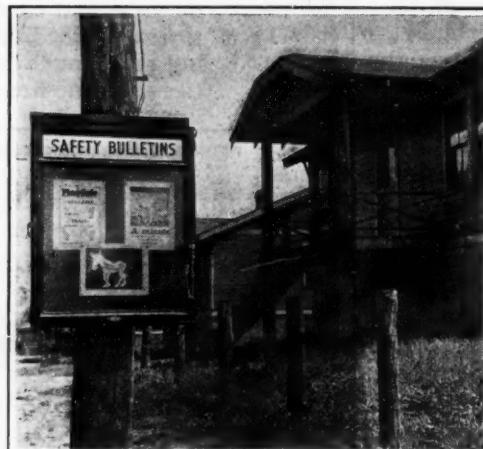
"Miners rarely have any adequate idea of what constitutes safety in coal mines" reads the report, "and this applies equally to the experienced miner and to the man who has worked in the mines only a few months." So an extensive campaign of education is advocated, to be supported by mining companies, in conjunction with the government and the states. The report also covers many other points of lesser importance.

Where Do Safety Bulletin Boards Attract Most Attention?

MINE managers, chiefly through the preachings of safety men and institutions, are well aware of the value of bulletin boards as a medium of educating the miner in safety; but in most cases they do not place the bulletin boards where they will be most read. C. E. Reynolds, superintendent of the Springdale mine of the Allegheny Pittsburgh Coal Co., near Pittsburgh, claims that the most frequently read bulletin boards are those that are posted at the junctions of main manways in the mine and at the important corners of streets in the mining town.

When miners are on their way in the mine to or from work, each time they pass a bulletin board at an important junction point their attention is attracted, for a moment at least, to the illuminated bulletins. Old bulletins which they have passed day after day register no distinct impression upon them, but—"What ho! a new series of bulletins; let's stop and read them." That really is the psychological effect of brightly lighted

educating miners in safety. It is she who worries more than the man over his life and limb while at work in the mine, for her bread and butter and that of her children, if she has any, depends upon his

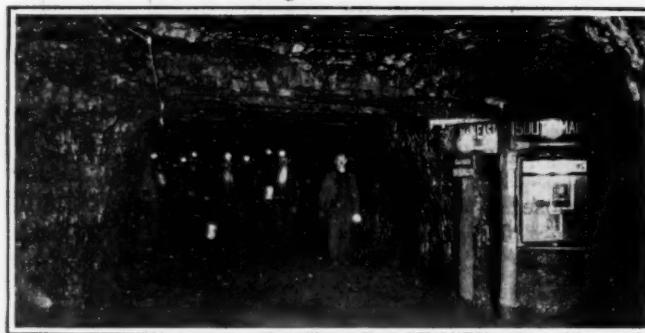


Bulletin Board in Mining Town of Logans Ferry

It is just as important to educate women and children to safety as it is to teach the men, for the former have a strong influence on the latter. It is wise to post a number of such boards in each mining town.

employment every day that the mine runs. It has been observed time after time, that a man who is injured in a mine accident quarreled with his wife before leaving home that day. Her quarrels with him often are an indirect cause of his being injured, but fortunately if she is the right kind of wife she has an equally strong influence in making him careful.

Knowing this, Mr. Reynolds has erected several bulletin boards on the streets of the village of Logans Ferry. During the day the women and children are often seen reading the bulletins, which if placed about the mine plant would not come under their observation. At night man and wife, when walking together, are attracted to the lighted bulletin board led by the greater curiosity of the women, and the husband gets a brief lecture on safety whether he wants it or not. More bulletin boards should be provided in the mine and in the town.



Illuminated Safety Bulletin Board

This bulletin board is certain to attract attention, for it is located on a much-traveled manway. These men are leaving the mine after a day's work. If one of them stops at this point for his "buddy" who may be farther down the line, he is likely to read the bulletins. Note the cleanly swept bottom along this manway. It is kept equally as clean for miles.

bulletin boards in the mine. The same boards in daylight in and around the bathhouse, at the shaft or pit-mouth, are passed unnoticed.

Woman can be made to play an important rôle in

How Should Loading-Machine Workers Be Paid?

Here Is a Presentation of the Arguments on Both Sides of the Case—for a Tonnage Scale and for a Daily Wage—by T. A. Stroup, Mine Superintendent, and S. W. Farnham, Mining Engineer

Ever since machines were devised for underground loading of coal, authorities in the industry have differed on the question: How should loader operatives be paid? The United Mine Workers officials, thinking that thereby the men would get a bigger share of the benefits from new mining machinery, have held out for tonnage rates. Operating men have taken both sides, but mainly they have favored day wages. Thus far in the development of loaders the operators have had their way, but the day scales now in effect in all union fields of this country are fairly high. In Illinois and Indiana the scale is \$10.07—although only Orient No. 2 mine is working the machines in Illinois—and Wyoming's rate is \$11.50.

Tonnage Pay Is Coming

"Loading machine operation eventually is sure to be paid for on a tonnage basis, I believe," said Mr. Farnham, "because, by that method of compensation, the machines are most likely to be worked nearer to their full capacity and, as another important factor, the attendant work around a loader will be more expeditiously done. There is no need to expect any loading machine to be operated steadily eight full hours every day. It simply cannot be done. No matter how good the machines of the future are, there always will be much necessary work connected with their operation, other than the running of the machine and this will always cause delays. Why even where loading is all done by hand, the men spend only about half their time actually shoveling coal into pit cars. How can it be greatly different when machines do the work?"

"So, bearing in mind that fact that there is, and always will be, a good deal of this sort of labor—trackwork, or moving of conveyors, shifting the loader about, cleaning up coal that overflows the car or misses the conveyor, loosening tight corners and a lot of other essential jobs—isn't it fair to assume that the miner who is paid only for the number of tons he loads is going to see that the loading goes on the maximum number of minutes? And if he is paid by the day, he will not be so speedy with all this aside work, will he? That is why I believe the tonnage basis will be adopted some time, although the time for it has not yet come."

"There is sound logic in the argument that tonnage scales ought not to be fixed right now, because the loading machine is developing fast and scales that are fair today would be outlandish tomorrow. But we should not get the idea that tomorrow or next year or five years from now is going to see the culmination of loader development. I don't think we will ever reach a point where we can say: 'Now we have the loader; it is time to make a tonnage scale.'"

Most operators of the country foresee the adoption of loading machines before long in almost every mine. Therefore, the question of wage scales is vital. Two interesting views on the issue were expressed recently in the West by men of life-long experience in coal and whose opinions are respected the country over. T. A. Stroup, superintendent of the Clear Creek Mines of the Utah Fuel Co., believes in the day wage and is sure the country will stick to it. S. W. Farnham, mining engineer of the Goodman Manufacturing Co., believes a tonnage scale will inevitably be adopted for the reasons he sets forth, although he would like to see the day wage perpetuated. Here is what they say:

Case for the Day Wage

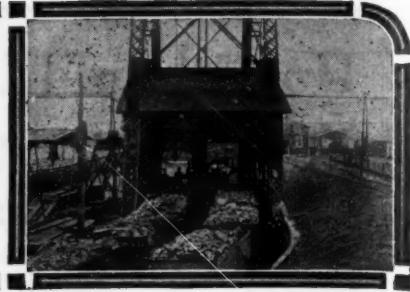
"I believe in the day wage for loading-machine operators," holds Mr. Stroup, "for several reasons, but the main reason is just this: Loading machines are going to force mine operators to assume full responsibility for what goes on at the face instead of passing the buck to the miner. This means men working at the face are going to be under more direct supervision—which will be easier with machine loading than it is now because of the future concentration of men working in few places."

"This concentration of men is going to play an important part. I am morally certain that the average miner would do more work if he were in a group than he does when he works alone; but even if this psychology failed, there is another important reason why the miner working around a loading machine at the face—and every other man in the whole mine, for that matter—will do more in a day than he does now. He is going to be a necessary cog in a machine. What he does depends upon what every other man in the system does, and what the others do, depends upon him. Don't overlook that."

"This is exactly the thing that makes the plants of Henry Ford such astonishing producers. The employers have devised systems of production which raise to the nth power the factor of interdependence of the workmen. There is a lot of facts at the base of those funny stories about the Ford employee who got fired. When somebody asked him why he lost his job, he replied that he dropped his wrench and before he could pick it up 865 cars had gone by him with the nuts that he should have tightened loose on their threads. They may be telling stories like that on the coal miner after awhile. The operator is being forced right now to develop a much better system in his mine. Heretofore he has been watching the tipple and selling the coal and damning the miner if the coal didn't come out. Hereafter, with money tied up at the face in loading equipment, he will devise ways of running every minute."



News Of the Industry



Consolidations and Consumer Ownership Stabilizing the Coal Industry

Many Transactions Being Quietly Consummated—Northwest Should Buy Coal or Consequences May Be Serious—Too Much Optimism Among Producers

BY PAUL WOOTON
Washington Correspondent of *Coal Age*

Two developments of far-reaching importance are in progress in the coal industry. Consolidations have been effected and are in course of consummation almost sufficient to constitute evolution. The number of captive mines is increasing by leaps and bounds.

When the Harding Coal Commission made its report, in which consolidations were recommended, there was no way of foreseeing that an economic situation would develop within a year which would bring about consolidations to an extent far beyond any hope the Commissioners may have entertained at that time. Under the compelling pressure of slack demand and the prospect of a long period of uninterrupted production increasing numbers of high-cost mines had been forced upon the market.

As many of these transactions are kept as quiet as possible and because there is no centralized point at which figures covering such transfers are available, there is no accurate knowledge as to the extent to which this tendency has progressed. Those in the best position to judge express the belief that the more powerful companies have absorbed a larger number of high-cost mines than is generally supposed. If current rumor has foundation several large deals of this character are about to be consummated.

Before the end of the year, it is predicted, enough mines will have been acquired in this manner to give a new degree of stability to the entire bituminous industry. Normal requirements will be furnished by low-cost mines. The less efficient mines will be held in reserve to be called into production to supply peak periods of demand. In this connection authorities on coal point out that the bituminous industry in the past has taken little advantage of economies of large scale production. The consolidations now being effected, they say, will do much toward setting an example in such matters as improved organization under ground which is regarded by some as one of the weak spots in bituminous operation. Better co-ordination or effort under ground as well as the employment of more engineers and better talent all call for capital expenditures which large interests can undertake and which are

denied to those without such resources.

It is regarded as unthinkable that consolidations of bituminous mines could reach the point where any monopolistic control could be exercised. Even were a consolidation to take on a dominating character in a single district it would have to meet interdistrict competitor. There has been serious discussion of large consolidation among the producers of smokeless coal. Even were it possible to effect such a grouping the industry could do no more than get into the anthracite class but even then its product would be more vulnerable to inroads from substitutes.

Though it is doubted that any unselfish reason could be advanced by coal operators to the captive mine this trend within the industry does not present the same constructive possibilities as flow from consolidations. These mines restrict the market more than they restrict the output. Most of these properties produce for their owners only.

Buying Mines at Bargain Prices

Public utilities and the manufacturing interests are taking advantage of the existing situation, just as are the stronger coal companies, to buy mines at bargain prices. Here again the situation is clouded by uncertainty due to the fact that no central agency has the money with which to collect exact information. It is known, however, that the number of captive mines has increased greatly. The aggregate of their output is thought to be approaching two hundred million tons, more than one-third of the annual production. This tendency is believed to be having an appreciable affect on the price of coal.

Officials in Washington continue to emphasize their belief that the people of the northwest have cause for concern for their supply of winter fuel. Unless there is an immediate improvement in the Lake movement the chances greatly favor a serious situation should there be an early descent of winter. The solution of the situation lies entirely in the hands of the consumers as coal must be moved off the docks before additional supplies can be received.

In some official quarters there is a tendency to discount some of the optim-

Robbers Hide in Mine

Three desperadoes thought to be the three who robbed the Palisades, Colo., postoffice of \$15,000 on Aug. 2, hid in the mine of the Palisades Coal and Supply Co., with a posse hot on their trail and were still defending themselves in the mine on August 8. The siege of the working attracted the attention of the whole West. The mine was shut down, all openings at the surface were flood-lighted at nights and a heavily armed guard surrounded the place continuously. The posse even entered the mine frequently. But, although it thought they shot one of the three, no captures were made. The sheriff once prepared to gas the men out of the old mine but this plan was vetoed, and the guard stayed on the job while the town looked on.

ism which has been so rampant for the past two or three weeks. They point to the fact that the level of unfilled orders for steel is a particularly important barometer so far as coal is concerned. In May there was a 20 per cent decline in unfilled orders. In June there was a further decline of 20 per cent. In July the decline continued at a slightly less rate—15 per cent. There is reason to believe that August will show a much more favorable figure, but if the situation in the steel industry is indicative of the general trend coal operators are having a hard time figuring where enough demand will originate during the remainder of the year to affect their business materially.

May Reopen West Kentucky Mines with Wage Cut

Unconfirmed reports at Louisville, Ky., say that leading coal operators in western Kentucky plan to reopen mines Aug. 25, on a 1917 wage scale, 25 per cent below that effective when about 8,000 miners went on strike April 15. Union miners are not expected to accept the scale. W. G. Duncan, president of the Western Kentucky Coal Operators' Association says there is nothing to the rumor and added "the situation is delicate and any mention of the 1917 scale would make no end of trouble." Secretary George Baker refused to affirm or deny the report and Lonnie Jackson, president of District 23, United Mine Workers, said the Union officials had not been consulted on the move.

State Insurance Will Continue Ten per Cent Below Company's Rates

The ten per cent differential of the State Workmen's Insurance Fund, which the insurance companies of Pennsylvania have been opposing since the fund was created in 1916, has been officially ratified by Governor Pinchot.

Samuel P. McColloch, State Insurance Commissioner, a year ago decided that the differential should be abolished, but he was overruled by Governor Pinchot and since then the companies have been endeavoring to get him to sustain the commissioner's views. The Governor said in a statement that the State fund is handicapped by being unable to pay commission to agents, that it must accept all risks and it can write only compensation insurance. The differential, he said, is an equalization which serves to balance in part certain disadvantages in cost of operation which weigh against the fund and not against the companies.

"At the time the State Workmen's Insurance Fund was established," the Governor said, "Many employees were not insured, thus leaving their workmen without sufficient protection. The fund was founded to make certain that every employer could, without fail, obtain insurance, and that his em-

ployees, in consequence, could be sure of the compensation to which they are entitled when accidents occur. When this administration took office there were still 50,000 employers in Pennsylvania who were not insured in either the State fund, in private companies or by self-insurance."

Most of the uninsured were small employers, many of them financially irresponsible, the Governor stated. Distress resulted because compensation due injured workmen or dependents could not be collected. There is little satisfaction, he said, to an injured workman to see his employer punished for not carrying insurance when he or his dependents are deprived of compensation properly due him under the law. In order to prevent such miscarriage of justice, eight states now provide compulsory workmen's insurance and require employers to take out insurance in the State insurance fund only. The Pennsylvania law provides for both State and private workmen's insurance.

"The State Fund is not an invasion by the State of the legitimate field of private business," said the Governor, "but a necessary welfare measure whose value to the working people of the State is beyond dispute." The statement declares that New York has a 15 per cent differential and Utah 20 per cent differential.

Anthracite Plants Lay Off Awaiting Orders and Cars

Action by the Glen Alden Coal Co. in the week ending Aug. 9 in shutting down five of its collieries temporarily because of car shortages may prove to be the forerunner of a series of similar closings by anthracite operators throughout the northern anthracite region within the course of the next few weeks.

Though the shortage of cars was the immediate reason for the shut-down, the fundamental explanation lies in the slackness of the coal market at the present time. Thousands of cars of anthracite now ready for market remain on sidings and at docks throughout the country waiting for buyers, and while this condition continues there will be difficulty in obtaining "empties" for operation.

With most predictions for the future of the coal market anticipating a healthy revival in coal sales about the first of September, it is not expected

that the present situation will last long after the first of the month, and one local company, the Pennsylvania Coal Co., expressed the belief that it would be able to go through the period from now until Sept. 1 without any shutdowns. The Glen Alden Coal Co. announced its shut-down for a period "of two or three days only."

Reports from the lower anthracite region are to the effect that the Lehigh Valley Coal Co. is contemplating closing down several collieries, due to market conditions.

All the collieries of the Philadelphia & Reading Coal and Iron Co. in the Schuylkill and Northumberland regions were shut down the entire week. "The overstocked condition of the market" was given as the reason for the shutdown.

The chain of operations at Lattimer operated by Pardee Brothers and Co., Inc., suspended operations for the first half of the week. The reason for the suspension was explained by a statement from the company to the effect that repairs were being made.



Clearfield Bituminous Coal Corporation's Tipple at Rossiter, Pa.

This structure, of concrete, steel and glass, is a good example of the practice, which has become general of recent years, of constructing all important mine buildings of permanent materials. Such buildings are so constructed today as to last throughout the estimated life of the mines they are intended to serve.

American Chemical Society To Discuss Coal Storage

Discussion of the nation's fuel supply will be a chief feature of the fall meeting of the American Chemical Society to be held at Cornell University, Sept. 8 to 13. Professor S. W. Parr, of the University of Illinois, will lead roundtable conferences on "The Storage of Coal and Spontaneous Combustion." Secretary Hoover's plans to relieve coal shortage and the report of the Coal Storage Committee of the American Engineering Council will be discussed.

The coal discussion will be held under the auspices of the Gas and Fuel Section, of which Dr. R. T. Haslam, of the Massachusetts Institute of Technology, is chairman. The Gas and Fuel Section will meet jointly with the Industrial and Engineering Division in a symposium on absorption. J. K. Davis, W. D. Langtry, N. R. Beagle, of Peoria, Ill., and W. H. Fulweiler, of Philadelphia, will participate in round-table discussion on coal led by Professor Parr.

The tentative program also includes the following original papers: "Studies on Absorption of Naphthalene in Gas Oil," D. L. Kowalek; "The Rate of Flame Propagation and the Mass Law," F. W. Stevens; "Radiation from Non-Luminous Flames," W. G. Lovell, R. T. Haslam and R. D. Hunneman; "The Present Trend of the Manufactured Gas Industry," F. W. Steere; "Combustion Relations within the Fuel Bed of a Gas Producer," R. T. Haslam, F. T. Entwistle and W. E. Gladding; "Composition of the Volatile Matter Obtainable from Coke," H. J. Rose and G. G. Desy; "True Measurement of High Gas Temperature," R. T. Haslam, E. L. Chappell; "Studies on Spontaneous Combustion of Coal," J. D. Davis, John F. Byrne.

Foreign chemists will take part in the Ithaca meeting, among them Sir Robert Robertson, president of the Faraday Society; Sir Max Muspratt, one of the leading industrial chemists of Great Britain; and Prof. S. P. L. Sorensen of Copenhagen, a leader of the academic school, and internationally known for his work on the hydrogen ion.

Kill Non-Union Miner With Bomb as He Enters Mine

A bomb was placed in a mine entry of the Hecla mine, of the St. Bernard division of the West Kentucky Coal Co., at Earlington, Ky., exploding when a switch was thrown to start current to a cutting machine, shortly before 8 a.m. Aug. 14, as a non-union crew was coming on the job. A colored mine worker was blown 30 ft. and instantly killed, and a driver was badly burned.

The explosion closely followed reports of Aug. 13 to the effect that mines in the section were to start non-union, Aug. 25. This is the first tragedy in the field since the strike was called on April 15. There are two airshafts close to the entry, and it is believed that the bomb was planted by entering through one of the airshafts. It is claimed that about 200 men are employed in the mine.

Gates Explosion, Says Jury, Due to Accidental Ignition of Explosives

According to the report of the coroner's jury, the explosion at the Gates mine of the H. C. Frick Coke Co., July 25, which killed ten miners, was due to the accidental ignition of explosives used by the shotfirers, in No. 21 Room, Seventh Butt, North Section. The flame, says the jury, ignited coal dust suspended in the air.

The board of five mine inspectors, named by the state, was divided as to the origin of the blast. Two contended that a fall of rock set off the explosives which ignited the coal dust and the others believed the gas may have accumulated in the vicinity of Room 21 and been ignited by coal-cutting machines.

The inspectors' report closed with the following recommendations: 1—That the ventilation be arranged so as to reduce to a minimum, the chances of short circuiting the air current. 2—That proper examination be made and efficient supervision provided for the workings on the night shift. 3—That the Federal Bureau of Mines withhold its approval of electric detonators unless the type submitted for approval provides against their being exploded accidentally by electricity. 4—That greater care be exercised in the handling of detonators and explosives. 5—That all electric wires and equipment be installed and maintained and operated so as to reduce the danger of arcing to a minimum.

Cumberland First-Aid Team Proves Best in Wyoming

A first-aid team from the Cumberland No. 2 mine of the Union Pacific Coal Co. won first prize at the Wyoming State First-Aid meet at Rock Springs, Wyo., Saturday, Aug. 9, with a score of 296 in a run-off with two other teams that had tied it at 293 for first place. Second place in the run-off went to the mine No. 4, Rock Springs team with a score of 294 and third to the team from Hanna, whose final score was 293. These three Union Pacific Coal Co. teams proved the best in the state. Fourth place went to a team from the Midwest Refining Co. from Casper, Wyo. It was this team's first venture in first-aid meets and W. D. Ryan, of the Bureau of Mines, who was master of ceremonies, complimented them highly. Also he said he had never seen better work in any first-aid meet in the country than was done by the various winners. The team that won first place was made up of these men: Capt. Lyman Fearn, T. H. Robinson, Jr., F. H. Buchanan, Charles Clark—substituting for Charles French who had been injured a few days before—and D. B. Ballantyne. The "patient" was Henry Goddard.

In the rescue contest which followed the first-aid meet, eight teams entered and No. 5 Mine of the Kemmerer Coal Co. which scored 175 won first place. Cumberland No. 1 and Hanna teams, both of the Union Pacific Coal Co., tied for second place with 165 and Cumberland won the cup on the toss of a coin.

Ford Will Enter Retail Coal Business

W. B. Mayo, chief engineer, Ford Motor Co., when he arrived in Duluth on the Benson Ford, with 12,000 tons of bituminous coal aboard, the first Ford boat to enter the harbor, announced that coal sales offices would be opened by the company in Duluth and the Twin Cities. At first, probably, only carload shipments will be sold. The cargo of the Benson Ford will go to the Ford plants in St. Paul and Minneapolis, but when, later, all arrangements are made, Ford-mined coal may be carried over a Ford railroad, the Detroit, Toledo and Ironton, be transported over the lakes in Ford boats, unloaded on a Ford dock (the Superior Coal & Dock Co.'s front just leased for one year by the Ford Motor Co.) and sold in Ford offices to the wholesale and retail trade, thus rescuing the Lake consumers from "the clutches of the coal profiteers." The D. T. & I., however, does not as yet tap Mr. Ford's eastern Kentucky fields.

Hudson's Bay Co. Entered Coal Business in 1852

An interesting part of the 1923 coal mining report of the Mines Department for British Columbia is the reproduction in facsimile of a letter dated Aug. 24, 1852, from James Douglas, then chief factor of the Hudson's Bay Co. in British Columbia, to Joseph McKay, a factor of the company, instructing him to proceed to Nanaimo (Nanaimo) Bay and to take possession "of the coal beds lately discovered there for and in behalf of the Hudson's Bay Co." and to levy a royalty on all coal mined there by anyone. This is the first authentic record of the commercial production of coal in this area.

The letter reads as follows:

"You will proceed with all possible diligence to Wentuhuysen Inlet, commonly known as Nanaimo Bay, and formally take possession of the coal beds lately discovered there for and in behalf of the Hudson's Bay Co.

"You will give due notice of that proceeding to the masters of all vessels arriving there and you will forbid all persons to work the coal either directly by means of their own labor or indirectly through Indians or other parties employed for that purpose, except under the authority of a license from the Hudson's Bay Company.

"You will require from such persons as may be duly licensed to work coal by the Hudson's Bay Company security for the payment of a royalty of 2/6 a ton which you will levy on the spot upon all coal whether procured by mining or by purchase from the natives, the same to be held by you and from time to time to be duly accounted for.

"In the event of any breach or evasion of these regulations you will immediately take measures to communicate intelligence of the same to me."

Italians Seek Coal Grant In Russian Field

An agreement soon to be concluded between Italy and Russia, according to the Mediterranean News Agency, will provide for the cession of a large section of the coal fields of the Donetz Basin to an Italo-Russian consortium for a number of years. By this agreement Italy hopes to be freed from dependence upon Great Britain, France and Belgium for her coal.

Three Mines to Be Shut Down Till Wage Contract Ends

B. M. Clark, president, Rochester & Pittsburgh Coal and Iron Co., has announced that Helvetia, Eleanor and Adrian will be closed down probably for two years, stating that with "an impossible wage scale" which makes the price of coal 50c. to \$1 less than the cost of production it is not feasible to operate these high-cost mines. Mr. Clark says: "We have reached the conclusion that the non-union fields can, and will, for several years to come, be able to furnish practically all the coal that the country demands and that the consumers will not pay us from 50c. to \$1 more per ton for coal than they can buy it for elsewhere. We expect to close not only the mines completely but the town also." The company has not yet decided whether to withdraw the pumps, but Mr. Clark stated that this probably will be done.

First-Aid Team

Cumberland No. 2, Union Pacific Coal Co. won first prize at Wyoming State First-Aid Meet.



Railroad to Nason Certified By Commerce Commission

The Interstate Commerce Commission has granted to the Jefferson Southwestern R.R. a certificate of public convenience and necessity to operate its line of railroad from Mount Vernon, Ill., to Nason, a new mining town, at which point is under development one of the largest coal mines in the world. It is owned by the Illinois Coal Corporation, with general offices in Chicago, of which Albert J. Nason is president.

The application for a certificate was granted by the Illinois Commerce Commission a year ago. It permitted this railroad to enter into intrastate business only. This case was hotly contested by some of the other carriers, but the Jefferson Southwestern R.R. finally won out through a Supreme Court decision, and although the interstate application was likewise opposed, the action of the Interstate Commerce Commission yesterday finally disposes of the matter.

New Road Thoroughly Modern

This new railroad connects at Mount Vernon with the Chicago & Eastern Illinois, the Louisville & Nashville, the Southern, and W. C. & W. and it is proposed to continue the construction of this new road from the new town of Nason to a connection with the Chicago, Burlington & Quincy. At present the road is furnishing double daily passenger service in each direction between Mount Vernon and Nason by the use of a gasoline motor coach, which, in addition to the passengers it hauls, accommodates shipments of express and U. S. mail. The new road is modern in every respect; having been built of new 90-lb. steel and treated ties. It has no bridges, only two curves, and a maximum of 0.3 per cent grade. It is constructed to carry the heaviest locomotives.

The new town of Nason, which is approximately eleven miles southwest of the county seat of Jefferson County, Mount Vernon, has been laid out with considerable care by city planners and engineers who have provided ample space for parks, schools, churches, and other public buildings. Where a year

Smokeless Coal Has Brisk Six Months of Operation

Total shipments of smokeless coal from southern West Virginia for the first six months of the current year aggregating 17,874,035 tons are 910,770 tons in excess of the first six months of 1923, according to a compilation made by the Winding Gulf Operators' Association.

ago was but a prairie is now a beautiful little city of over one thousand people, and it is expected that within the next three years this little town will have a population of over 5,000. The new mine is designed for a capacity of from twelve to fourteen thousand tons per day.

Howat Runs for President of International Union

Alexander Howat, enfant terrible of District 14, United Mine Workers, is being dressed in his Sunday best for the international elections, the second Tuesday in December. Locals throughout the district already are sending in letters to the international board urging his nomination for international president.

Alex. isn't as popular with the neighbors as he is at home, however, and those who are pushing his campaign for the international presidency realize there is a good chance of his being declared ineligible by the board, before which he is on probation. Should the board take this action, time will remain to enter his name for the district presidency.

It was as president of District 14, a couple of years ago, that Howat, establishing a record for keeping his men on strike, got in bad not only with the Kansas state industrial court, but also with the international board. Only a few months ago the report came from Pittsburg, Kan., that he had gone back to work with pick and shovel in an effort to get reinstated in the union, and that one of the locals of the district had accepted his application for membership.

Five Non-Union Miners Shot At Bull Hill, Oklahoma

War against the open shop mines of the Wilburton district in Oklahoma was renewed the night of Aug. 11, when five non-union miners, returning home from work in the Bull Hill mine, eighteen miles east of Wilburton, were shot from ambush and wounded severely. The attack took place on the eve of the preliminary hearing at Wilburton, of thirty-seven union miners accused of participating in the raid on the Kali-Inla mine near Cambria, Okla., last month. And it followed by only a few days the shooting from ambush of a non-union miner, fishing near the scene of the attack of Aug. 11.

The five men were the first of the day shift to quit the mine. They were followed closely by their comrades, who reached them, however, too late either to protect them or to catch their assailants. The Bull Hill mine employs fifty men. It is owned by J. B. Hilling, Ray Morgan and W. B. Merchant, of Red Oak, Okla. It has been operating as a non-union mine several weeks.

Canada Delays Shock Attack On United States Coal

At a conference held at Edmonton, Alta., between Premier Greenfield, Hon. Charles Stewart, Dominion Minister of the Interior, and Sir Henry Thornton, President of the Canadian National Railways, it was decided that the projected experimental shipments of Alberta coal to Eastern Canada would not be undertaken this year, owing to lack of time to make the necessary arrangements.

The Premier pointed out that he had had no information from Ottawa as to any arrangement for putting into effect the contemplated plan of federal aid, and that until the Dominion authorities took action in that direction nothing could be done. Hon. Mr. Stewart said that assistance from the Dominion Government would be conditional upon the operators reducing their prices on the coal going East as they must be willing to co-operate with the Government by cutting prices at the mine if the Government is to help to pay the cost of transportation.

Anthracite Produced—Breakers, Washerries and Dredges In 1923—By Regions

Region	(Compiled by H. L. Bennit, U. S. Geological Survey)						Total Production Gross Tons	Value a
	Gross Tons	Shipments Value a	Gross Tons	Local Sales Value	Gross Tons	Used for Power Value		
Lehigh:								
Breaker product.....	9,538,147	\$62,782,100	558,796	\$2,135,158	1,008,884	\$1,752,849	11,105,827	\$66,670,107
Washery product.....	521,744	1,675,656	3,383	3,403	19,363	68,881	544,490	1,747,940
Dredge product.....	94,725	124,538	0	0	0	0	94,725	124,538
	10,154,616	64,582,294	562,179	2,138,561	1,028,247	1,821,730	11,745,042	68,542,585
Schuylkill:								
Breaker product.....	20,377,383	133,635,367	554,910	3,570,662	2,626,295	1,887,047	23,558,588	139,093,076
Washery product.....	1,552,511	6,185,369	186	1,110	59,537	47,550	1,612,234	6,234,029
Dredge product.....	284,682	306,184	462,231	369,520	6,370	5,107	753,283	680,811
	22,214,576	140,126,920	1,017,327	3,941,292	2,692,202	1,939,704	25,924,105	146,007,916
Wyoming:								
Breaker product.....	39,092,074	270,555,028	1,308,115	7,761,854	3,110,108	4,353,633	43,510,297	282,670,515
Washery product.....	1,680,032	7,215,898	4,852	14,611	174,518	352,536	1,859,402	7,583,045
Dredge product.....	5,592	5,476	0	0	300	240	5,892	5,716
	40,777,698	277,776,402	1,312,967	7,776,465	3,284,926	4,706,409	45,375,591	290,259,276
Sullivan County:								
Breaker product.....	280,822	1,912,541	7,841	51,450	5,000	13,000	293,663	1,976,991
Totals breaker product.....	69,288,426	468,885,036	2,429,662	13,519,124	6,750,287	8,006,529	78,468,375	490,410,689
Washery product.....	3,754,287	15,076,923	8,421	19,124	253,418	468,967	4,016,126	15,565,014
Dredge product.....	384,999	436,198	462,231	369,520	6,670	5,347	853,900	811,065
Grand total.....	73,427,712	\$484,398,157	2,900,314	\$13,907,768	7,010,375	\$8,480,843	83,338,401	\$506,786,768

a Value given is value at which coal left possession of producing company mines f.o.b. and does not include margin of separately incorporated selling companies

"Niggerheads" in Utah Coal Are Dinosaurs' Tracks

An article appearing in the current issue of *Natural History*, written by Prof. William Peterson, director and geologist of the agricultural experiment station of the Utah Agricultural College, describes and accounts for the tracks of prehistoric dinosaurs in the roofs of Utah coal mines.

Professor Peterson says, in part:

"To view the tracks of ancient cretaceous monsters is not an entirely new experience, but to view these tracks from beneath instead of from above is somewhat of a novelty. This is a privilege open to those interested in the ancient life of the cretaceous seas of Utah and Colorado. It was the writer's good fortune to spend three summers in a detailed survey and inspection of the coal deposits of Utah. While he was examining the underground workings of many of the mines, attention was called to certain protuberances from the coal-seam roof. A definite shape had been recognized in the case of some of these, though most of them were spoken of as "car-buncles," "niggerheads," and under similar terms. In areas where the coal was low these protuberances had to be removed to give room for the mine hauling, for some of them projected as much as a foot below the roof of the coal seam. In some places the projections appear in groups while in others they are solitary.

"After inspecting hundreds of these protuberances, the writer agrees with some of the mine foremen and superintendents that these peculiar formations undoubtedly had their origin as tracks of ancient monsters which tramped through or around the border of the cretaceous seas. The tracks seem to have been made at a time when the peat accumulation was covered with a foot or more of mud. The layer of mud was not sufficiently thick to support the weight of the animal walking over it. The feet sank through the mud several inches or even more than a foot at times, into the soft yielding peat underneath. Some mud was pushed into the peat as the animal brought down its weight, and as it drew out its foot the footprint would be filled with mud from above.

Peat Changed to Coal

"As time went on, nature's distillation reduced the peat to coal, and the mud with its track projections was converted into solid rock. In most places the coal is easily separated from the roof, leaving the track-shaped protuberance extending partly or wholly as a definite appendage from the ceiling. When the coal is completely removed, the tracks appear in various forms. In some cases the footprints project only part way through the roof and in others they project so far that a clear space is shown between the portion of the track represented by the toes and the solid roof. It is interesting to note that, as far as observed, the largest tracks are the ones which protrude farthest from the rock roof. The material filling the track varies slightly, but is for the most part an arenaceous shale or argillaceous sandstone.

"The animals seem to have walked for the most part along trails or definite paths. It was noted that some of these paths are 20 or 30 ft. in width, and the exposures in many entries and rooms of the coal mines show them to be comparatively straight in alignment. The individual tracks in the paths are seldom clearly outlined, and only when one of the animals has traveled independently does every imprint become distinct. In several places it has happened that an entry of the coal mine has followed approximately the path of a single animal, thus exposing several of the tracks for measurement and comparison. Seven consecutive tracks are shown in the old Ballard mine on the property of the American Fuel Co., located on the Denver & Rio Grande R.R. about eight miles north of Thompson Springs. These tracks are among the largest observed.

"In a different entry of the mine, tracks of similar size are found, and by courtesy of the company one of these was taken down and shipped to the geological museum of the Utah Agricultural College at Logan. The track measures 31 in. between the spread of the outer toes and 32 in. from the heel to the front of the middle toe. Near the point of separation the toes are from 6 to 8 in. in diameter, and the toes are so pointed as to indicate the presence of rather sharp claws on the end of each toe."

Kentucky Insurance Company Fails to Pay Compensation

C. C. Ousley, secretary of the Associated Industries of Kentucky, in a bulletin issued today, makes a strong appeal for safe insurance, in a comment under the heading: "Employer Left to Hold the Bag." He said:

More than one employer probably experienced an unpleasant sensation on reading a recent newspaper dispatch telling how a judge of the Court of Appeals has refused to restrain the sheriff of an eastern Kentucky county from executing judgment against a coal company on an award of the Kentucky Workmen's Compensation Board in favor of an injured employee. The facts as stated in the press, were that the company had insured its liability with a carrier which was doing business in the State in the spring of 1922, when the accident occurred, and which, it is claimed, at the time stood approved by the Workmen's Compensation Board. The carriers' license was not renewed the following July, and about a year later the insurance company went out of business. He adds:

"If the facts are as reported in the press, improved administration is one of the things which would bring greater comfort to the mind of the insuring employer. Not only close supervision of carriers while they are in this field is desirable, but assurance that on retirement they are leaving behind deposits adequately protecting their former clients. This is essential to assure the employer a good night's rest where he has workers with allowed claims. Care in the selection of a carrier is of course something the employer himself can exercise with profit."

Gutheim Opposes a Rehearing Of Northwest Freight Case

Reply to the reasons advanced for a rehearing in the case of the Northwestern Coal Dock Operators' Association versus the Chicago & Alton Railroad Co. has been made by August G. Gutheim on behalf of the C. Reiss Coal Co. and the Milwaukee Western Fuel Co. In opposing the rehearing, Mr. Gutheim points out that the Interstate Commerce Commission and other government organizations in forcing, protecting and pooling the movement of coal to these docks indicates that the docks constitute a necessity for the fueling of the Northwest. "This admitted," he says, "it hardly could be argued seriously that they were entitled to do business only at such times as other producers could not take care of all northwestern needs. If that be the rule, then the docks, with their enormous investment in facilities and in coal, are ruined."

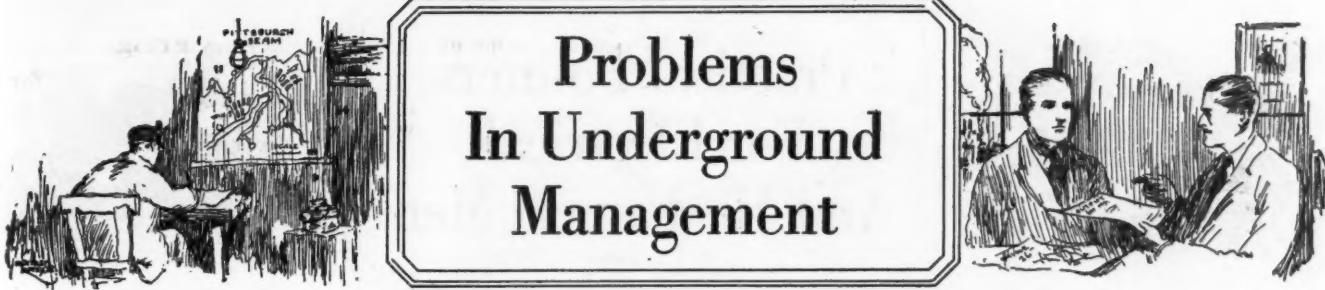
He cites figures to show that "the tonnage from southern Illinois has increased in greater proportion than that from the docks." He refers to the inference on the part of southern Illinois carriers to the effect that southern Illinois rates were exceptionally low. Mr. Gutheim further contends that the commission is amply empowered to make the orders which have been attacked by the Illinois Coal Traffic Bureau and the Wisconsin Traffic Association. At another point in his brief, Mr. Gutheim makes this important statement:

Shippers Entitled to Protection

"All these petitioners seem to overlook the fact that not only the consumers, but the shippers, whether docks or mines and the carriers are entitled to the protection of the law. The complainants for whom this answer is filed, did not begin this litigation. Certainly they never started out with the sole purpose in mind of making consumers pay more for coal. But as has already been noted, they were compelled, as a matter of defense to the complaint originally filed by the Illinois interests, to file a complaint bringing in issue the rates from southern Illinois—the real shipping rates, which were carefully left out of the picture by the Illinois complainants. It is only as a result of this that there have finally come the orders of the commission under attack.

Say Rates Should Not Be Changed

"The docks were compelled as a matter of defense to raise before the commission the lawfulness of the adjustment between themselves and southern Illinois in reaching Wisconsin destinations. The petitioners stress the fact that this is no time to increase rates. The fact remains that the docks in adopting their plan of defense against the attack of Illinois were under the necessity of recognizing that this commission might consider the present no time to reduce any of the rates here involved. The question being originally raised by Illinois, and the unlawful preference and prejudice being found to exist, the commission has done the only thing permitted by the law in ordering its removal."



Problems In Underground Management

Roof, Ribs and Floor Wetted by This Sprinkler Car

BY FRED SCAMMEL
War, W. Va.

EXPLORATIONS resulting from accumulations of coal dust within the mines, have caused many mining companies to seek means for allaying such dust. The Warrier Coal Co., at War, W. Va., has given serious consideration to this problem, with the result that the sprinkler car shown in the accompanying illustration has been developed and put into use.

In operation this car is pushed along the track ahead of a locomotive. Inasmuch as the water is projected forward in a cone-shaped spray the men operating the machine are always kept dry, even though all surfaces of the rooms, headings and other passages where this machine is used are thoroughly and impartially wetted down.

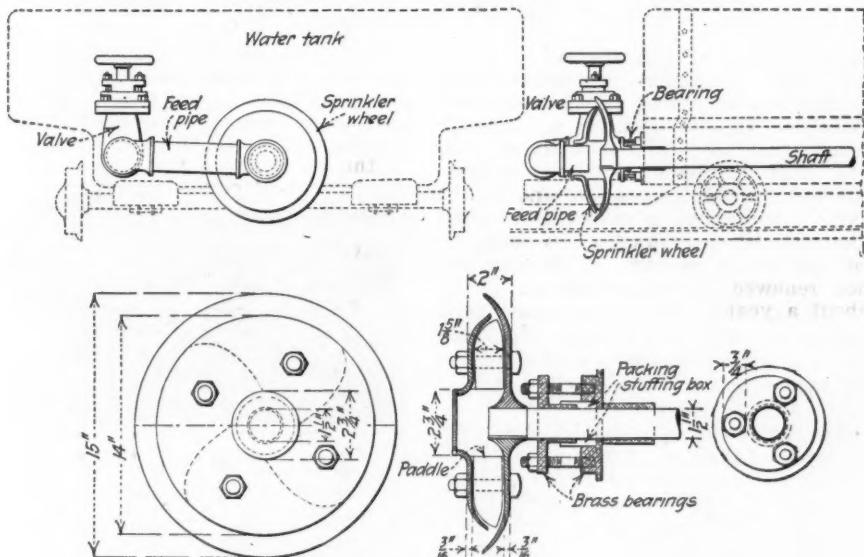
This machine sprinkles floor, roof and ribs alike, only two men being required for its operation, and the entire mine may be treated by it in from 4 to 5 hr. Thus far highly satisfactory results have been secured by its use. Its operation has been endorsed by the district mine inspector.

This sprinkler consists of a tank of 1,000 gal. capacity mounted on a mine-car truck. On the rear end of this truck is placed a 3-hp. motor which is

back-gearred to a shaft extending through the tank. On the forward end of this shaft, which is fitted with stuffing boxes where it passes through the tank walls, a sprinkler wheel is mounted. This is fed with water from the tank through a 2-in. pipe.

Probably the most unusual feature of this machine is the sprinkler wheel. This somewhat resembles the impeller of a centrifugal pump, consisting essentially of two disks, cupped in opposite directions, with vanes between them. The rear disk overlaps the forward one so that the water issuing from between them is directed forward by it. Water is thus projected from the wheel in a cone-shaped spray.

Ribs, roof and roadway are thus sprinkled, the machine throwing water onto the entire perimeter of the passage within which it operates. Furthermore the sprinkler will thoroughly wet down the face of a room even though the track may not extend entirely to the face. The bug dust and other fine coal in the room is thus wetted down and may be loaded out without the danger of its flying about which is always present when such material is loaded dry.



Sprinkler Car and Some of Its Details

The sprinkler head or wheel, which is operated by a motor on the rear of the car, both in appearance and effect somewhat resembles the impeller of a centrifugal pump. Inasmuch as the rear disk is cupped

forward and overlaps the front disk, water is thrown ahead of the car in a cone-shaped spray, thoroughly wetting all surfaces of the mine passage while the men operating the car are kept dry.

An Uncleaned Shothole May Cause a Misfire

BY GEORGE EVANS

Technical Representative E. I. du Pont de Nemours

Coal dust in boreholes affects the proper detonation of ammonia permissible dynamites. Where jackhammers are used, a $\frac{1}{4}$ to 1-in. gas pipe is connected to the air line and then pushed into the borehole two or three times, so as to blow out the dust. This procedure will not clean the holes completely especially if they are from 6 to 9 ft. long. Enough dust remains so that when the dynamite cartridges are loaded a certain quantity of it will lodge between the cartridges. The results of allowing coal dust to interpose itself between cartridges of ammonia permisibles can be seen readily from the following tests, which were made by placing a certain quantity of coal dust between two $1\frac{1}{4} \times 8$ -in. cartridges of permissible powder. No tamping was used and the charges were unconfined.

Tests of Detonation of One Cartridge by Another with Explosive Unconfined

Thickness of Coal Dust Between Cartridges, Inches	Number of Tests Made	Failures to Detonate Second Cartridge
1	5	0
1	5	0
1	5	5

It will be noted that 1 in. of coal dust sufficed to prevent the detonation of one cartridge by another.

Additional tests were made to determine what results would be obtained if certain quantities of coal dust were placed between two $1\frac{1}{4} \times 8$ -in. cartridges of permissible explosives loaded in a borehole, but in this case with the charges well confined by tamping. Much better results were obtained as indicated below:

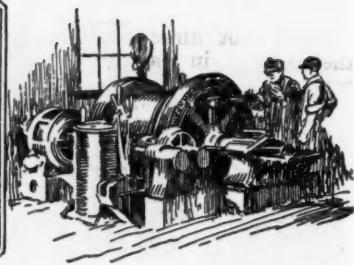
Test of Detonation of One Cartridge by Another with Explosive Confined

Thickness of Coal Dust Between Cartridges, Inches	Number of Tests Made	Detonations of Second Cartridge	Failures of Second Cartridge
2	5	5	0
3	2	1	1
4	2	1	1
5	2	1	1
6	2	1	1

It will be noted that the confined charge did not fail until 2 in. more of coal dust had been introduced than was the case with unconfined charges. This again proves that tamping boreholes full to the collar is necessary to obtain satisfactory results from these ammonia permisibles.



Practical Pointers For Electrical And Mechanical Men



How Repair Costs Have Been Reduced By a Large Coal Company

By Knowing How Electrical Apparatus Is Constructed Better Care Is Taken—Meters and Instruments Are Periodically Tested and Checked

AT THE main office of the Pennsylvania Coal & Coke Co., Cresson, Pa., every possible means has been provided to familiarize the workmen with electricity. The rapid expansion of the various uses of electrical energy has made it almost impossible for even those directly working with it to study its many applications.

Workmen at the mines use electrical equipment as tools to assist them in their labors. To them electricity is usually an unknown science. Nevertheless, these men must learn to operate the new machinery and so must learn something about the mysterious power by which it is driven.

Hazards and accidents are always frequent when a man does not understand his work or the equipment he uses. A repair man who must keep the electrical apparatus in good condition can do his work much better if his knowledge of electricity is not limited to a few elementary ideas of the subject.

To tell a workman or mine foreman that he must not overload his machines does not carry any convincing evidence of the damage that

may result. Oftentimes the men do not know when they are endangering themselves or others or damaging apparatus. It was with these points in mind that J. F. MacWilliams, the electrical engineer of the company, started, in the room shown in the large illustration, a school of instruction for his men and other workmen at the mines who are responsible for the use of electrical equipment.

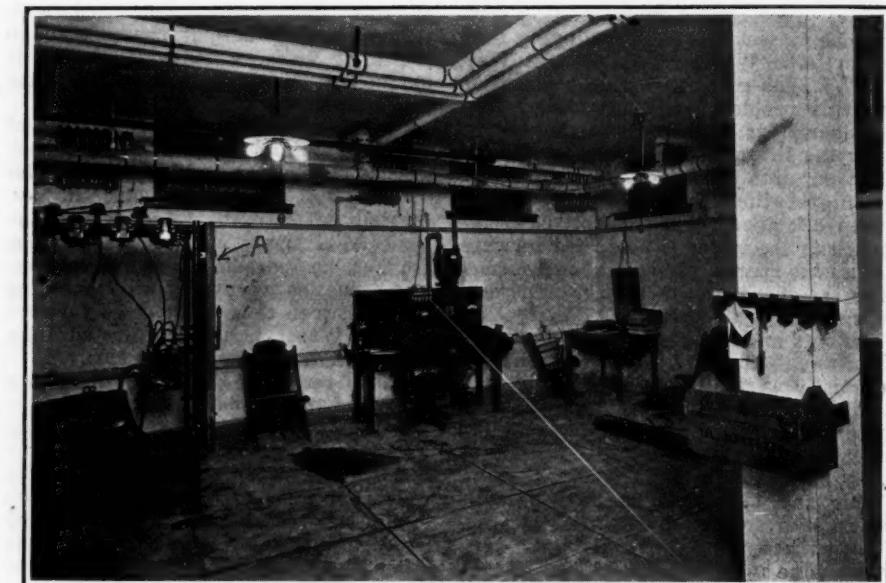


Fig. 2. Classroom and Laboratory Combined at Pennsylvania Coal & Coke Co.'s Cresson Office

This is where the workmen gather to study the machines they work with. At the board A both alternating and direct current are available for tests. Demonstrations are carried on here to show how different machines and parts function.

This room is equipped with an alternating-current circuit from which, by the use of transformers and a motor-generator set, it is possible to obtain any desired alternating- or direct-current voltage.

Every Thursday evening is held a class in practical electricity. Machinery commonly used around the mines is studied, taken apart and tested. The important features of the apparatus are described and its function and limitations are considered.

Recently the class finished the construction of a rotary converter made from a 15-hp. crane motor. This machine was built and tested to illus-

tion, Fig. 3, shows some of the testing meters used in the school. In the center of the group is a new bond testing instrument developed by Mr. MacWilliams. Aside from being used

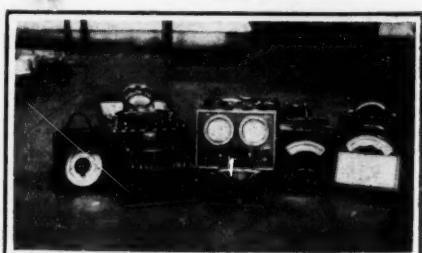


Fig. 3. Group of Testing Instruments

These meters make it possible to test almost any piece of electrical equipment while in operation. These instruments are also part of the metering apparatus used by the company.

as a classroom, periodic tests and inspection of electric meters, instruments, etc., are made here. In a separate room nearby, spare repair parts and emergency equipment are kept.

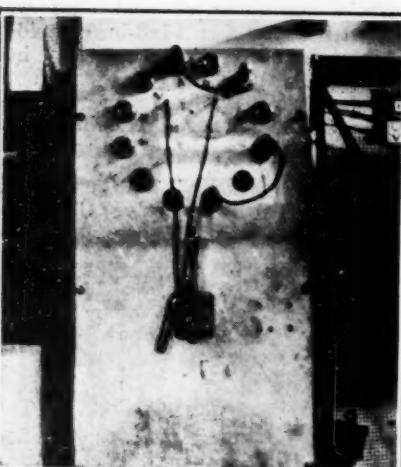


Fig. 1. Alternating-Current Test Board

By changing the connections on this board many different voltages are obtainable for testing purposes. Single-, two-, three- and six-phase circuits can be taken from the panel.

By using the room for these different purposes the cost of the equipment is not directly charged against the school; in fact, the use of the room by the class is after working hours. Many novel and interesting devices have been worked out in this little laboratory, and the reduced maintenance costs at the mines have amply repaid the management for the investment necessary for training the men in the care of electrical machinery.

Slitting Chisel You Can Make for Yourself

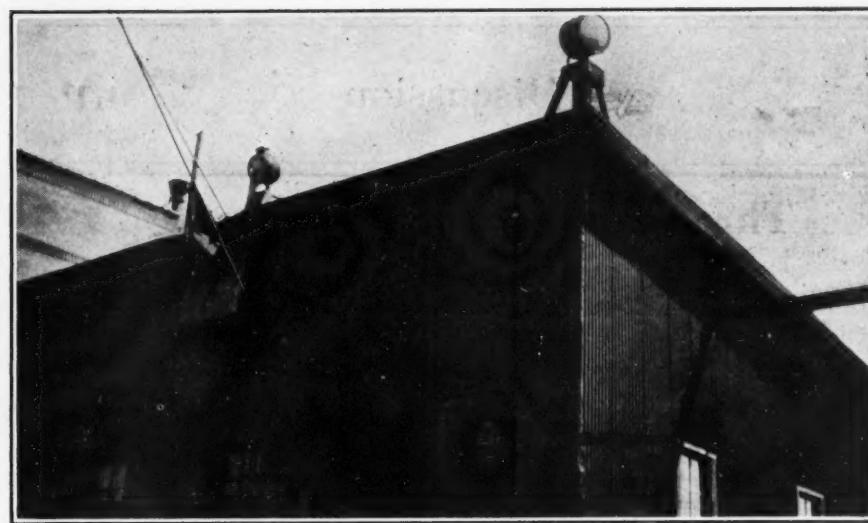
The mechanical man at the coal mines often has need for special tools that cannot be purchased at any store or supply house and which, consequently, must be made on the job. One such implement known as a slitting chisel is shown in the accompanying sketch. Although this is an extremely



Tube-Slitting Chisel

useful instrument for slitting tubes, shearing plates and the like, and although there is nothing particularly new about it, yet it can seldom, if ever, be found for sale in the ordinary hardware or tool store.

For tube cutting, as in removing a tube from a boiler, the blade should be slightly longer than the diameter of the tube. As may be seen this blade is relieved throughout its length to prevent its binding in the incision made. The edge or point is square, that is, the cutting done is a shearing action on the square corner of the blade point. In cutting off a tube one corner of the point is first driven through the tube wall and then a strip cut out entirely around the tube.



Projector Lamps Light This Mine Yard

These units are placed so as to reflect the light over wide areas thus providing good lighting for all important sections. On dark winter days the output of these mines will not be lowered due to lack of light.

Floodlighting the Mine Yard

Oftentimes is it difficult to light certain regions around the mine yard. Ordinary lamps with flat reflectors cannot be located where the light is most needed. Poles or posts promiscuously placed are often in the way when changes are being made. Breakage, theft and loss is most frequent when lamps may be easily reached. Perhaps most serious of all is the dust and dirt which usually sticks to the open lamp and reflector and seriously cuts down the light.

At the No. 15 Mine of the Consolidated Coal Co., near Staunton, Ill., most of the outside mine lighting is done by floodlight lamps installed on permanent structures in the yard. These lights project a wide cone of light which illuminates a large area. Because the lamps and reflectors are enclosed the quantity of light furnished does not

vary. What little dirt gets on the glass cover of the unit is easily washed off by the rain or removed by occasional cleaning by one of the workmen.

One Way to Keep the Yard Safe and Clean

It is rather unusual to visit a mine and not find it necessary to walk through carbide dust. At Thermal

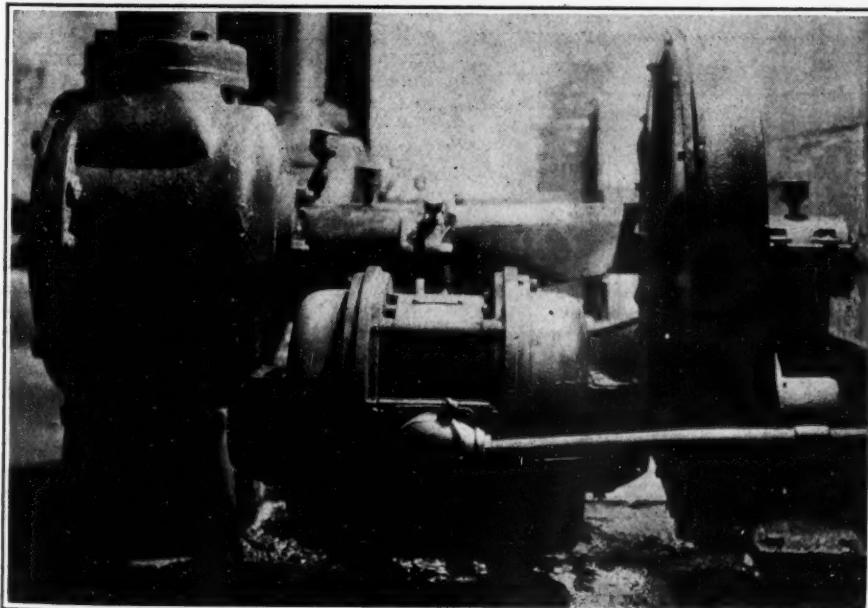


Where Carbide Lamps are Emptied

By providing receptacles like these the fumes of carbide are not spread all around the mine yard.

Mine No. 4 of the Donk Bros. Coal and Coke Co., near Edwardsville, Ill., artistically designed boxes set up on small poles are located where the miner can empty his carbide lamp when he leaves the mine.

Careless throwing of carbide around the mine yard often causes accidents to say nothing of the obnoxious smell that arises from the dust whenever it rains or snows.



Pumping Unit Works Whenever Water Enters the Sump

This unit consists of a motor and a pump, the latter having geared parts which, without priming trap the water or air inside the pump casing and discharge it. The pump operates continuously and keeps its sump nearly empty at all times. Owing to the simplicity of its construction the pump requires little attention.

Discussion

Three Suggestions to Methods of Mining a Difficult Coal Seam

Best Plan Probably Is to Use a High-Cutting Machine to Cut Out the Rash Above the Bottom Seam

In the problem which a West Virginia operator propounds on page 22 of this volume I assume that the 10 in. of drawslate is loose enough that it will fall when the coal is shot down and that the roof above the drawslate is a good hard stratum that can be held in place. The seam could be worked by what is known as the double-entry or double-stall system. In this system the room is driven usually 40 ft. wide where there is a good top and bottom. This makes it possible to use two tracks for loading out the coal, and to build all refuse into walls or to stow it in the gob between the tracks. The tracks on each side of the room should be kept 4 ft. clear of the room ribs. This allows posts to be set along the side between the track and the rib side of the coal. A row of posts is set also along the other side of each track. The posts usually set in the gob should also be used in this instance. The drawslate could be used to form a berm along the gob side of the track.

Two methods of extraction could be used successfully. The coal-cutting machine could be set on the top of the bottom or 11-in. seam of coal, allowing the machine to make its cut in the 5½ in. of mixed slate and coal. Then, perhaps, the 4½-in. seam of coal and the 4½ in. slate parting might fall as the machine is undercutting it. If not it could be taken down by an experienced man. He

might have to put in a few light shots to dislodge it, but that operation would not be laborious enough to prevent the work being done at a reasonable figure.

made in the soft slate which could be thrown in the gob. The top coal could then be shot down and loaded out. The other refuse probably would not be

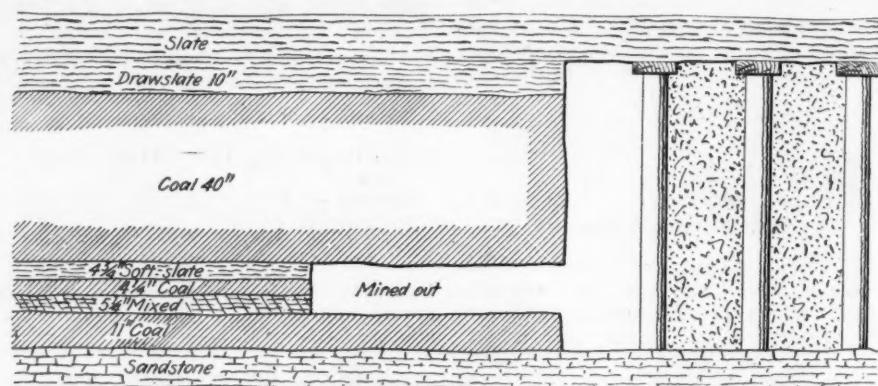


Fig. 2—Rubbish in Seam Is Partly Cut Out and Partly Removed by Powder or Bar. Upper and Lower Benches Are Then Loaded

Of course more room must be left than is shown between gob and coal face and where an ordinary low-cutting mining machine is used, the lower bench must be left 6 ft. behind the face of the upper bench.

The cuts thus enlarged could be shoveled out into the gob and stowed there, thereby leaving the top coal whole. This would uncover the bottom coal so that it could be removed later and at the same time it would free the main seam.

However, the machine cut might be

difficult to lift. This would expose the 11-in. seam which could be mined somewhat later. I am assuming, of course, that the 11-in. seam is good coal.

In my opinion the latter scheme is the better, even if it should cost a few cents more to lift the 4½ in. of coal and the 5½ in. of rash. If a 6-ft. cut was made by the cutting machine it should not be difficult to remove the underlying 9½ in. Of course, if this method were adopted, the miners would have to take due precautions while removing the refuse. The coal would have to be supported by sprags as shown in the illustration.

As the top coal is hard, a good shot in each corner and a number of light shots across the face would bring down the face if the sprags were redrawn. Another suggestion is to get a machine that would stand on the hard sandstone bottom and cut in either the soft slate or the rash as has been outlined. I understand that there are a number of machines in the market that will cut at a level 12-in. or more above the floor. By using such a machine the bottom coal could be kept up with the main seam and a good bottom on which the machine would travel freely would be available. This would be better for timbering and loading. In the first two plants the bottom coal would have to be left at least 6 ft. back of the main coal face in order to give the machine a berm on which to travel. The last suggestion would appear to be the best.

Newcastle, Wash. JAMES GRAY.

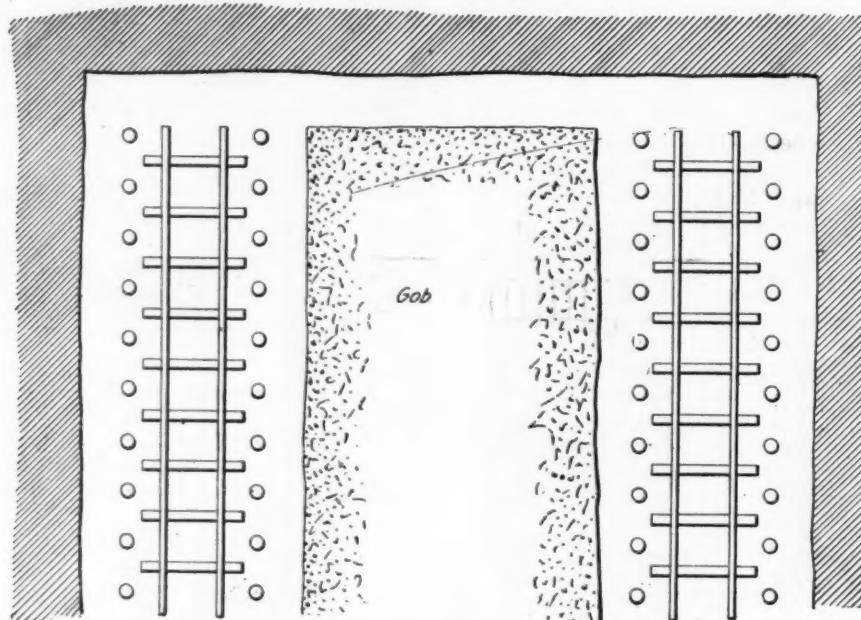


Fig. 1—Double Entry Room with Two Tracks and Gob Between

Posts are put on either side of track to give firm support to roof. Drawslate, soft slate, rash and thin bed of coal will more than fill gob.

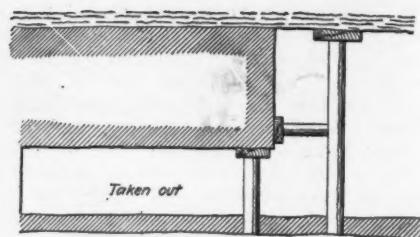
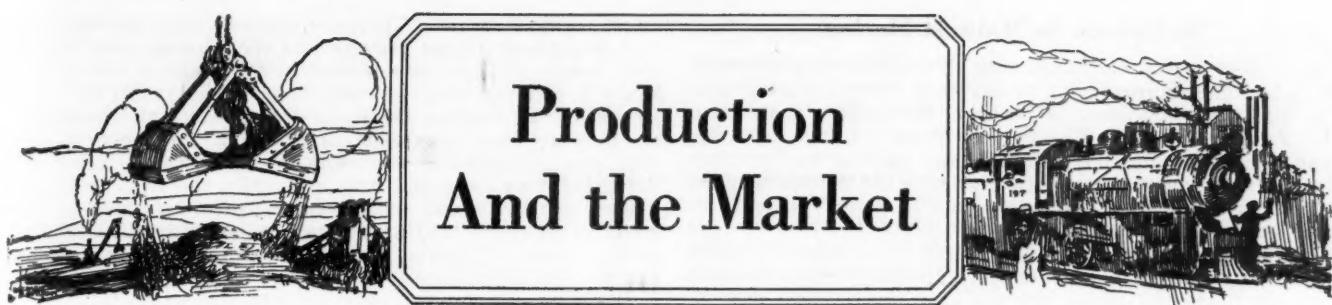


Fig. 3—Supporting Sprags

While the waste material is being removed upper coal bench will have to be supported, not necessarily, however, by posts sunk through bottom bench.



Production And the Market

Lack of Funds of Manufacturers and Householders Restricts Sales, but Soft-Coal Prices Improve

In the Middle West the bituminous-coal industry seems to be experiencing a slight improvement, but in the East, especially in New England, the report is quite discouraging. The public appears to be delaying buying not only from a sense that coal will be available when demanded but because business has been so poor that money is not obtainable for the making of purchases, even where the consumer has a conviction that there will be a scarcity this winter and that it would be well for him to get under cover. The cry seems general that purchasers are slow to pay. But in the Northwest, where the farmer is looking for and actually experiencing prosperity and the ore mines are preparing for resumption, the coal is not being taken from the docks so that more can be brought in. There is need for greater circumspection in that region, for the indications are that the wherewithal to purchase coal is not lacking.

Spot-Price Index Advances

Coal Age Index of spot prices of bituminous coal shows an increase during the past week, standing on Aug. 18 at 165, the corresponding price being \$2.00, as against 163 and \$1.98 the previous week.

Hampton Roads dumpings for all accounts during the week ended Aug. 13 totaled 395,568 net tons, an increase of 36,652 tons from the week preceding.

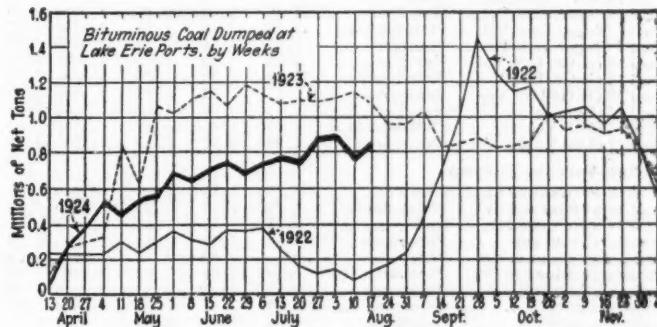
A sharp upturn marked the movement of coal at the lakes, dumpings during the week ended Aug. 17, according to the Ore & Coal Exchange, being as follows: For cargo, 765,872 net tons; for fuel, 42,785 net tons, compared with 725,168 and 47,054 net tons respectively during the preceding week.

The production of bituminous coal for the week ending Aug. 9 increased slightly, the output according to

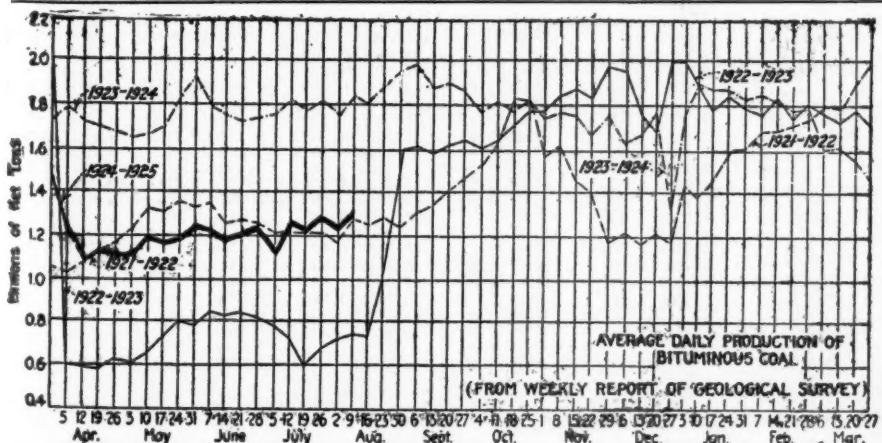
the Geological Survey, totaling 7,800,000 net tons. The previous week showed an output of 7,484,000 tons according to revised figures. Anthracite production decreased, being 1,683,000 net tons in the week ending Aug. 9 and 1,720,000 tons in the previous week.

Hard-Coal Market Depressed

Anthracite is even more loggy than bituminous coal though stove size seems to be in great demand. However, if there were a big supply that demand would soon evaporate. Unless the anthracite companies have a similar demand for other sizes they are unable to comply with the insistent demand for stove, which in economical operation can represent only a certain por-



tion of the whole production. The purchase of anthracite seems to be delayed by the lower earning ability of the consumer. He finds all his dollars expended for immediate needs and does not look to the future. If he does not buy soon, however, the retailers will be doling out anthracite in single-ton lots and the snowbirds with their poor coal will come back, eventualities good neither for public, operator nor retailer.



Estimates of Production

	(Net Tons)	1923	1924
BITUMINOUS			
July 26	10,817,000	7,543,000	
August 2 (a)	10,564,000	7,484,000	
August 9 (b)	9,851,000	7,800,000	
Daily average	1,866,000	1,300,000	
Cal. yr. to date (c)	332,386,000	269,684,000	
Daily av. to date	1,775,000	1,435,000	

	1923	1924
ANTHRACTITE		
July 26	2,080,000	1,837,000
Aug. 2	2,018,000	1,720,000
Aug. 9	1,735,000	1,683,000
Cal. yr. to date (c)	62,569,000	55,372,900

	1923	1924
COKE		
Aug. 2 (a)	345,000	95,000
Aug. 9 (b)	326,000	89,000
Cal. yr. to date (c)	12,139,000	6,669,000

(a) Revised since last report. (b) Subject to revision. (c) Minus one day's production to equalize number of days in the two years.

No Change in Midwest Market

Domestic buying continues slow in the Midwest, although there is some improvement in southern Illinois high grade. The cheaper coals seem to be at a standstill. Anthracite and smokeless are slow, but coke shows a little activity. Wagonload steam is not a factor, and carload and country steam are sluggish. Domestic business for certain grades of coal in the country shows up well in spots. This forecasts good conditions a little later.

In the Carterville, Duquoin, Mount Olive and Standard fields the situation is unchanged. In the Carterville and Duquoin fields the mines are working one or two days a week with a mine here and there doing better. In these latter fields and in the Standard all sizes remain unbilled on track. The Mt. Olive moves a little railroad tonnage, but little domestic coal is sold, and the steam tonnage just about keeps up with contract requirements. In the Standard field some mines are closing and some starting. Lump movement to the Northwestern territory has improved a little and screenings have been in demand for a day or two. Strip mines are making headway. Tonnages are increasing and the mines run steadily with prices 25c. @ 50c. below

those of shaft mines. They are loading some railroad coal.

A much better tone prevailed in the Chicago coal market this week. Orders were booked in satisfactory volume and many promising inquiries were received. For the first time in weeks the holding tracks in the Chicago switching districts were free from distress coal and for the first time this year substantial contracts were closed. High-grade domestic lump, egg and nut, especially the first two mentioned, are moving in some volume to the Northwest. The country retailers in Illinois and Indiana are still holding back. West Virginia and Kentucky splints are being shipped in large quantities and the quantity will increase if the proposed through rates go into effect this fall.

There is no change in the St. Louis situation, although a little domestic business has begun to move through the dealers, mostly for middle-grade coals. Anthracite, smokeless and coke are moving slow and for standard there is no demand at all. A little wagonload steam is moving and orders for carload steam are hard to find. Country domestic is picking up and this improvement is quite noticeable. Country steam, however, is slow and there is nothing of any consequence moving out to Chicago or the Northwestern steam markets.

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

Market Quoted	Aug. 20 1923	Aug. 4 1924	Aug. 11 1924	Aug. 18 1924†	Market Quoted	Aug. 20 1923	Aug. 4 1924	Aug. 11 1924	Aug. 18 1924†
Low-Volatile, Eastern					Midwest				
Smokeless lump..... Columbus.....	\$5.85	\$3.60	\$3.60	\$3.50@ \$3.75	Franklin, Ill. lump..... Chicago.....	\$3.90	\$2.85	\$2.85	\$2.75@ \$3.00
Smokeless mine run..... Columbus.....	3.00	2.10	2.10	1.85@ 2.15	Franklin, Ill. mine run..... Chicago.....	2.85	2.35	2.35	2.25@ 2.50
Smokeless screenings..... Columbus.....	2.35	1.20	1.20	1.15@ 1.30	Franklin, Ill. screenings..... Chicago.....	1.65	1.70	1.70	1.60@ 2.10
Smokeless lump..... Chicago.....	5.75	3.85	3.85	3.75@ 4.00	Central, Ill. lump..... Chicago.....	2.60	2.50	2.50	2.50@ 2.75
Smokeless mine run..... Chicago.....	3.00	1.85	1.85	1.75@ 2.00	Central, Ill. screenings..... Chicago.....	2.10	2.10	2.10	2.00@ 2.25
Smokeless lump..... Cincinnati.....	6.10	3.75	3.85	3.75@ 4.00	Ind. 4th Vein lump..... Chicago.....	3.35	2.60	2.60	2.50@ 3.00
Smokeless mine run..... Cincinnati.....	3.00	1.85	1.85	1.75@ 2.00	Ind. 4th Vein mine run..... Chicago.....	2.60	2.35	2.35	2.25@ 2.50
Smokeless screenings..... Cincinnati.....	2.75	1.30	1.30	1.25@ 1.50	Ind. 4th Vein screenings..... Chicago.....	1.55	1.70	1.70	1.75@ 1.85
*Smokeless mine run..... Boston.....	5.30	4.30	4.20	4.10@ 4.20	Ind. 5th Vein lump..... Chicago.....	2.75	2.35	2.35	2.25@ 2.75
Clearfield mine run..... Boston.....	2.35	1.90	1.90	1.85@ 2.35	Ind. 5th Vein mine run..... Chicago.....	2.10	2.10	2.10	2.00@ 2.25
Cambria mine run..... Boston.....	2.85	2.30	2.25	2.00@ 2.30	Ind. 5th Vein screenings..... Chicago.....	1.40	1.55	1.55	1.30@ 1.65
Somerset mine run..... Boston.....	2.60	2.05	2.05	1.75@ 2.50	Mt. Olive lump..... St. Louis.....	3.00	2.85	2.85	2.75@ 3.00
Pool I (Navy Standard)..... New York.....	3.05	2.70	2.30	2.25@ 2.35	Mt. Olive mine run..... St. Louis.....	2.00	2.50	2.50	2.50
Pool I (Navy Standard)..... Philadelphia.....	3.40	2.80	2.80	2.60@ 3.00	Mt. Olive screenings..... St. Louis.....	1.50	2.00	2.00	2.00
Pool 9 (Super. Low Vol.)..... New York.....	2.55	2.05	2.05	1.90@ 2.25	Standard lump..... St. Louis.....	2.40	2.15	2.15	2.00@ 2.35
Pool 9 (Super. Low Vol.)..... Philadelphia.....	2.75	2.15	2.15	1.95@ 2.35	Standard mine run..... St. Louis.....	1.85	1.80	1.80	1.75@ 1.85
Pool 9 (Super. Low Vol.)..... Baltimore.....	2.50	1.95	1.95	1.90@ 2.00	Standard screenings..... St. Louis.....	1.00	1.20	1.20	1.15@ 1.25
Pool 10 (H.G. Low Vol.)..... New York.....	2.20	1.80	1.95	1.70@ 2.00	West Ky. lump..... Louisville.....	2.20	2.10	2.10	2.10@ 2.35
Pool 10 (H.G. Low Vol.)..... Philadelphia.....	2.30	1.75	1.75	1.65@ 1.90	West Ky. mine run..... Louisville.....	1.75	1.55	1.60	1.40@ 1.85
Pool 10 (H.G. Low Vol.)..... Baltimore.....	2.25	1.70	1.70	1.65@ 1.75	West Ky. screenings..... Louisville.....	.90	1.15	1.15	1.15@ 1.25
Pool 11 (Low Vol.)..... New York.....	1.85	1.50	1.60	1.50@ 1.75	West Ky. lump..... Chicago.....	2.10	2.05	2.05	2.15@ 2.45
Pool 11 (Low Vol.)..... Philadelphia.....	1.85	1.45	1.45	1.35@ 1.60	West Ky. mine run..... Chicago.....	1.30	1.60	1.60	1.35@ 1.75
Pool 11 (Low Vol.)..... Baltimore.....	1.90	1.55	1.55	1.50@ 1.60					

High-Volatile, Eastern

Pool 54-64 (Gas and St.)..... New York.....	1.75	1.50	1.50	1.35@ 1.65			
Pool 54-64 (Gas and St.)..... Philadelphia.....	1.75	1.50	1.50	1.40@ 1.60			
Pool 54-64 (Gas and St.)..... Baltimore.....	1.85	1.45	1.45	1.40@ 1.50			
Pittsburgh se'd gas..... Pittsburgh.....	2.80	2.40	2.40	2.30@ 2.50			
Pittsburgh gas mine run..... Pittsburgh.....	2.10	2.10	2.00@ 2.25	Pittsburgh mine run (St.)..... Pittsburgh.....	2.05	1.85	1.75@ 2.00
Pittsburgh slack (Gas)..... Pittsburgh.....	1.55	1.30	1.30	1.25@ 1.40			
Kanawha lump..... Columbus.....	3.00	2.10	2.10	2.00@ 2.25			
Kanawha mine run..... Columbus.....	1.85	1.45	1.40	1.30@ 1.55			
Kanawha screenings..... Columbus.....	1.05	1.05	1.05	1.00@ 1.15			
W. Va. lump..... Cincinnati.....	3.25	2.25	2.25	2.00@ 2.50			
W. Va. gas mine run..... Cincinnati.....	1.70	1.35	1.45	1.45@ 1.65			
W. Va. steam mine run..... Cincinnati.....	1.70	1.35	1.45	1.35@ 1.50			
W. Va. screenings..... Cincinnati.....	1.05	.90	.85	.85@ 1.00			
Hoocking lump..... Columbus.....	2.75	2.45	2.45	2.25@ 2.65			
Hoocking mine run..... Columbus.....	1.85	1.55	1.55	1.45@ 1.65			
Hoocking screenings..... Columbus.....	1.10	1.05	1.05	1.00@ 1.15			
Pitts. No. 8 lump..... Cleveland.....	2.60	2.40	2.40	2.00@ 2.85			
Pitts. No. 8 mine run..... Cleveland.....	2.05	1.85	1.85	1.85@ 1.90			
Pitts. No. 8 screenings..... Cleveland.....	1.20	1.10	1.20	1.20@ 1.40			

South and Southwest				
Big Seam lump..... Birmingham.....	3.50	3.40	3.40	3.30@ 3.50
Big Seam mine run..... Birmingham.....	1.95	1.75	1.75	1.50@ 2.00
Big Seam (washed)..... Birmingham.....	2.35	2.00	2.00	1.75@ 2.25
S. E. Ky. lump..... Chicago.....	3.10	2.10	2.10	2.25@ 2.75
S. E. Ky. mine run..... Chicago.....	1.80	1.50	1.50	1.35@ 1.90
S. E. Ky. lump..... Louisville.....	2.85	2.10	2.10	2.00@ 2.25
S. E. Ky. mine run..... Louisville.....	1.85	1.55	1.55	1.25@ 1.75
S. E. Ky. screenings..... Louisville.....	1.00	.95	.95	.85@ 1.10
S. E. Ky. lump..... Cincinnati.....	3.25	2.35	2.35	2.25@ 2.50
S. E. Ky. mine run..... Cincinnati.....	1.60	1.45	1.45	1.40@ 1.75
S. E. Ky. screenings..... Cincinnati.....	1.05	.90	.95	.85@ 1.15
Kansas lump..... Kansas City.....	4.00	4.50	4.50	4.50
Kansas mine run..... Kansas City.....	3.25	3.50	3.50	3.50
Kansas screenings..... Kansas City.....	2.60	2.50	2.50	2.50

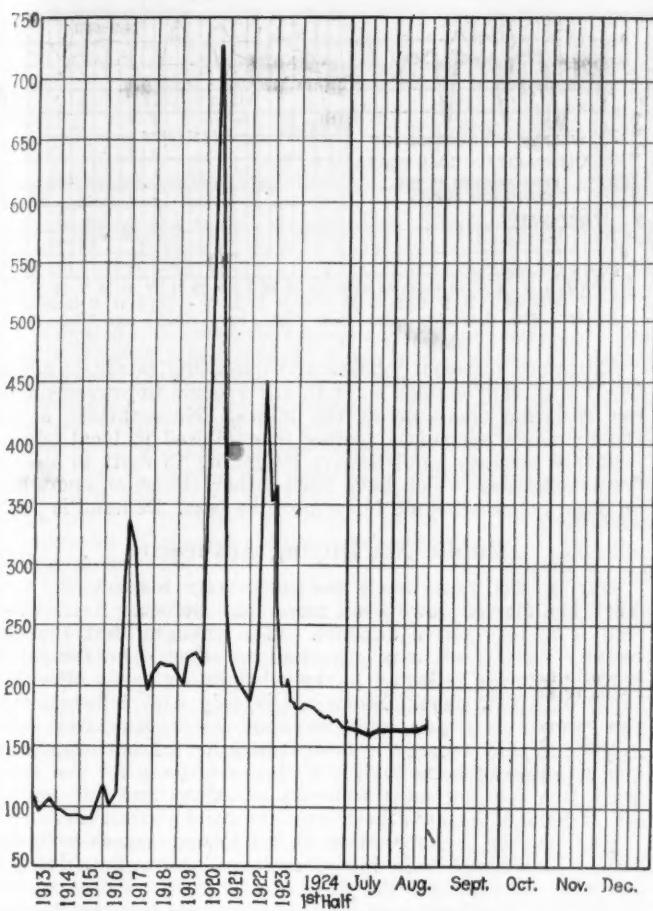
* Gross tons, f.o.b. vessel, Hampton Roads.

† Advances over previous week shown in heavy type, declines in italics.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

Market Quoted	Freight Rates	Aug. 20, 1923	Independent	Company	Aug. 11, 1924	Independent	Company	Aug. 18, 1924†
Broken..... New York.....	\$2.34			\$7.75@ \$8.35			\$8.00@ \$9.10	
Broken..... Philadelphia.....	2.39			7.90@ 8.10			8.90@ 9.05	
Egg..... New York.....	2.34		\$8.50@ 12.50	8.00@ 8.35	\$8.50@ \$8.75	8.65@ 9.10	\$8.35@ \$8.75	8.65@ 9.10
Egg..... Philadelphia.....	2.39		9.25@ 11.00	8.10@ 8.35	9.00@ 9.70	9.00@ 9.05	9.00@ 9.70	9.00@ 9.05
Egg..... Chicago*.....	5.06		8.50@ 12.00	7.25@ 7.45	8.10@ 8.25	8.02@ 8.12	8.09@ 8.20	8.09@ 8.20
Stove..... New York.....	2.34		8.50@ 13.00	8.00@ 8.35	9.25@ 9.60	8.65@ 9.45	9.25@ 9.60	8.65@ 9.45
Stove..... Philadelphia.....	2.39		9.25@ 11.00	8.15@ 8.35	9.35@ 10.00	9.05@ 9.10	9.35@ 10.00	9.05@ 9.10
Stove..... Chicago*.....	5.06		8.50@ 12.00	7.25@ 7.45	8.40@ 8.60	8.30@ 8.45	8.40@ 8.50	8.43@ 8.53
Chestnut..... New York.....	2.34		8.50@ 12.50	8.00@ 8.35	8.25@ 8.75	8.65@ 9.15	8.25@ 8.75	8.65@ 9.15
Chestnut..... Philadelphia.....	2.39		9.25@ 11.00	8.15@ 8.35	8.65@ 9.80	9.00@ 9.05	8.85@ 9.80	9.00@ 9.05
Chestnut..... Chicago*.....	5.06		8.50@ 12.00	7.25@ 7.45	8.20@ 8.32	8.24@ 8.38	8.18@ 8.33	8.28@ 8.34
Range..... New York.....	2.34			8.30		8.90		8.90
Pea..... New York.....	2.22		6.75@ 8.50	6.00@ 6.30	5.50@ 5.25	5.50@ 6.00	5.25@ 5.25	5.75@ 6.00
Pea..... Philadelphia.....	2.14		7.00@ 7.50	6.15@ 6.20	5.75@ 6.25	5.75@ 6.00	5.75@ 6.25	5.75@ 6.00
Pea..... Chicago*.....	4.79		7.00@ 8.50	5.30@ 5.65	5.15@ 5.60	5.36@ 5.91	5.23@ 5.55	5.36@ 5.91
Buckwheat No. 1..... New York.....	2.22		3.00@ 3.50	3.50@ 4.15	2.00@ 2.25	3.00@ 3.15	2.00@ 2.25	3.00@ 3.15
Buckwheat No. 1..... Philadelphia.....	2.14		3.50	2.50	2.50@ 3.00	3.00	2.50@ 3.00	3.00
Rice..... New York.....	2.22		2.25@ 2.50	2.50	1.70@ 2.00	2.00@ 2.25	1.70@ 2.00	2.00@ 2.25
Rice..... Philadelphia.....	2.14		2.50	2.50	2.00@ 2.25	2.25	2.00@ 2.25	2.25
Barley..... New York.....	2.22		1.25@ 1.50	1.50	1.15@ 1.40	1.50	1.15@ 1.40	1.50
Barley..... Philadelphia.....	2.14		1.50	1.50	1.50	1.50	1.50	1.50
Barley..... New York.....	2.22			1.60		1.60		1.60

* Net tons, f.o.b. mines. † Advances over previous week shown in heavy type, declines in italics.



Coal Age Index of Spot Prices of Bituminous Coal F.O.B. Mines

Index	1924			
	Aug. 18	Aug. 11	Aug. 4	Aug. 20
Weighted average price	\$2.00	\$1.98	\$1.98	\$2.38

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States, weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913-1918," published by the Geological Survey and the War Industries Board.

Louisville Breathes More Easily

The feeling in Louisville is much better than it has been, for the fall demand for prepared sizes is developing, with much better general demand scattered over various sections of the country. Eastern Kentucky operators are busier than they have been, and have fewer cars of unsold coal on track. Some of them claim that except for the industrial demand for screenings the price would have been reduced and prices of prepared coal correspondingly increased. Indications are that there will be advances of 25@50c. a ton on prepared sizes by the end of the month, or early in September, regardless of the screenings market, which will break if prepared demand improves.

Demand in the western Kentucky producing sections is improving somewhat on scattered orders from various sections for prepared sizes, while increased industrial activity is taking care of present production of screenings, which is a shade higher than they have been and in good demand. As a result of better demand and better operating time, and with about half the field still strike bound, there is an upward tendency in the price quoted.

Northwest Growing More Hopeful

Trade in Duluth generally is stronger, although Kentucky run-of-pile was reduced to \$5.50 from \$5.75. Forty-three cargoes arrived this week of which eleven were anthracite. There will be probably plenty of hard coal in the Northwest this year to meet requirements. Twenty-two cargoes are reported on the way from lower lake ports and of these five are hard coal.

The anthracite market seems to be starting, the weather being unseasonably cold. Inquiry is better in bituminous. The iron mines are preparing to start operations.

Prices on soft coal in the Twin Cities remain about as they have been for some time. So southern Illinois coal has been on the basis of \$2.75@\$3 for some time. Dock prices are unchanged.

The volume of business in the Milwaukee coal market continues unchanged. The slight spurt in buying, heretofore noted, has subsided and business is quiet with buyers showing a total lack of interest both in city and country. Lake receipts are slow. Thus far cargo receipts of anthracite aggregate 412,438 tons and of soft coal 1,519,893 tons. This represents a falling off of 20 per cent in the former and about 33 per cent in the latter compared with last year's receipts up to this time.

Business is slow to pick up in the Southwest. Prices are unchanged from last week. Arkansas semi-anthracite is \$5.50 to \$7 for lump; \$3.50 for mine run and \$2 for screenings. Henryetta, Okla., lump is \$4.50; nut, \$4; mine run, \$3.25 to \$3.50 and screenings, \$2.

The market in Colorado shows little, if any, change from last week. Though a number of inquiries have been received coal sales are still slow with dealers buying only that for which they have immediate need. The mines averaged twenty hours last week with 48 per cent of the working time lost on account of lack of market. Prices are unchanged.

In Utah the mines are working about three days a week. Prices are unsettled. Only domestic lump is moving satisfactorily. The metal-mining industry is providing a fair market for coal. The sugar factories are taking some slack and the railroads are buying a little more coal than they were, but both the latter markets are poor. The Central Western Regional Advisory Board has passed a resolution urging all consumers to buy their supplies now.

Cincinnati Just a Little Happier

Prices have changed a little in Cincinnati during the past week, and the undertone is firmer, for consumers are now disposed to buy.

Bituminous coal for domestic use is passing in greater volume to the Northwest and the minimum price for steam slack has increased owing to a decreased production of block and 4-in. lump. Run-of-mine also is a bit stronger. Egg and 2-in., the favorite lake sizes, are the only makes that have failed to show a definite price change.

With a slightly better feeling in domestic coal circles the Columbus coal trade continues to show a better tone. Dealer buying is now the best feature. Some retailers still have good stocks, but others are almost to rock bottom and are coming into the market. City dealers are having a better trade but hardly up to normal for the time of year. Householders are showing preference for smokeless, splints and Kentucky varieties, although a fair quantity of southern Ohio coal is moving. Demand for steam tonnage shows no material improvement. Slack is plentiful and prices weak, although there is now less demurrage coal on the local market. Production shows only slight increases. In the Hocking Valley and Pomeroy fields the output is about 15 per cent of capacity. Lake trade is showing signs of a let-up owing to congestion at some of the lower lake ports.

Pittsburgh Slowly Recovers

In the last two months there has been a noticeable increase in production in the Pittsburgh district, but this has represented increased business between operators and their regular customers rather than heavier sales in the open market. The former business replaces the usual contracts for the coal year and is subject to periodic adjustments. For the Pittsburgh district steam mine-run these have averaged close to \$1.90 right along. Some business is done probably at \$2, but little if any as low as \$1.75, that being a price reached in the spot market frequently by small operators who have no regular trade and often sell through dealers. Some coal has been shipped in the lake trade but for affiliated interests.

Some Connellsburg operators are trying to sell steam coal, coal that, running above the sulphur limit for coking, is otherwise good in analysis, but soft. This often sells at \$1.50 and sometimes at \$1.40. Connellsburg Sewickley, better in structure but not in analysis, sells as low as \$1.10.

Operators and jobbers report that in general the demand for steam fuel in eastern Ohio shows an improved tone with inquiries more numerous and more odd-lot buying. Some industrial contracts have been made during the past few weeks covering fuel requirements up to March 31 next. Domestic trade also is improving. Retail yards are more active. The strongest demand and weakest supply in the steam trade is for slack and nut and slack, which accounts for a stiffening in prices on these grades.

Some shippers to the Buffalo market, mostly near producing centers, are asking a little more for their coal, but Buffalo shippers decline to pay it. Bituminous prices remain unsteady at \$2.25@\$2.50 for Youghiogheny gas lump, \$2@\$2.25 for Pittsburgh and No. 8 steam lump, \$1.50@\$1.75 for all mine run and \$1.10@\$1.25 for slack.

New England Not at All Cheerful

The slightly firmer price tendency in tidewater coal at Boston, noted in last week's issue, has entirely disappeared so that \$5.40 gross ton on cars, Boston, has been the going figure for New River and Pocahontas. It is reliably reported that one shipper has offered good quality coal at \$5.25 on cars if a large tonnage is purchased. The offering of a cargo of nut and slack at about \$5.25 on cars Boston made buyers surmise that there had been further break in mine-run prices and buying slowed considerably. For mine-run coal, \$5.40 on cars, Providence, is as low as is known to have been named this week, but \$5.50 has been obtained not infrequently and a little tonnage actually brought \$5.60. Some, not Pool No. 1, has been offered at \$5.25 on cars, Providence.

The southern loading ports have shipped quite freely the past week and stocks are large at privately owned docks. High-grade low-volatile coal is reported as offered at \$4 gross ton, f.o.b. Hampton Roads, but local shippers have been unable to pick up quality coal in cargo lots at less than \$4.10 and \$4.20 has been paid. This does not mean, however, that no \$4 coal has been shipped to New England.

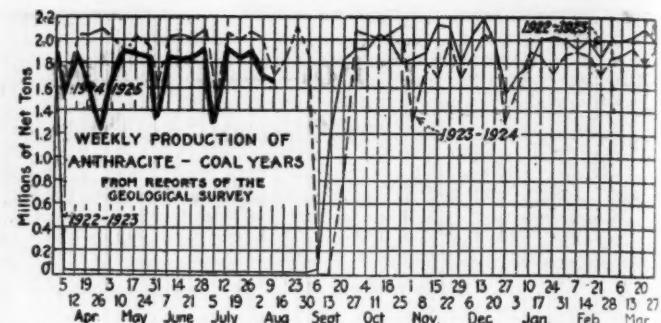
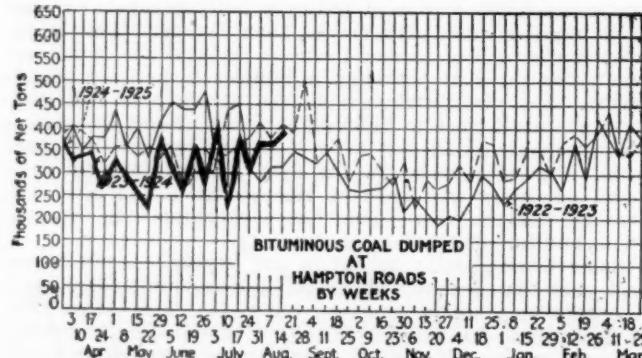
The all-rail bituminous market remains dull though a little more active in the past week. A few small lots of choice steam coal have sold at \$2.90 net ton, mines, in the face of offerings of certain Pool No. 1 at \$2.35.

Coastwise vessel freights are firming noticeably, 80@85c. now being demanded for steamers of about 5,000 tons, Hampton Roads to Boston, against 70c. a few weeks ago. For this size of boat to Providence 75c. has been refused the past week and 80c. demanded. The larger tonnage craft—7,500 tons—can be chartered to Boston at 65c.

More Inquiries in Atlantic Coast Markets

In the soft-coal market of New York there is no change of consequence, but an increased number of inquiries have been received. It is thought that the trade has passed through the worst of the depression. A feature of the local market in an unfavorable way is the low rate of freight being quoted from Hampton Roads. It has the effect of curtailing still more the market for Pennsylvania coal.

No one can get enthusiastic about the improvement in the Philadelphia market, as the tonnage moved is still light, though increasing. The smaller users, who ask for prices about this time of the year, are making inquiries and buying a few cars. There is still much conflicting opinion as to business conditions. Railroads are only taking their normal supply of fuel, with no disposition to stock-up. Prices are unchanged.



Baltimore soft-coal jobbers and operating interests admit freely that they cannot point to any specific improvement in the situation there or at the mines. Nevertheless a decidedly more optimistic feeling is exhibited in local offices, probably because inquiries are beginning to drift in slowly from industries which have been either closed or operating on a part time schedule for some time past. Demand is poor.

Public Not Buying Anthracite

During the past week the anthracite market in New York has slowed down even more than before. Even stove coal is in less active demand. It is thought that the unusually warm spell may have had an effect upon the retail trade, that was reflected in the wholesale market after the lapse of a few days. Stove is the only coal selling above the company circular, and even that is dragging a bit now.

Philadelphia records a faint indication of betterment in the retailing of hard coal. The big producers for the third week are running on a four-day schedule, and but few of the independents have been able to avoid short time.

The retailer is disposed to fill all vacant spaces with nut coal. Experience tells him that it will be well to have it on hand long before the first of the year. Prices at the mines are stabilized, and none of the more responsible concerns show any indication of shading them. The demand for stove does not waver, but as most of the buying is for the winter, the dealers are content to wait their turn for it. Pea and egg are still a bit quiet. The big mining companies are not storing prepared sizes this year so the public cannot draw from that source in the winter. Steam coals are still dull, barley being in best demand.

The hard-coal purchasing public of Baltimore remains largely unresponsive to the appeals of anthracite coal dealers to place their orders quickly. Coal retailers have declared without result that there will probably be another 25c. per ton advance in prices on Sept. 1.

In Buffalo the anthracite trade is slow as ever, many people not earning enough to pay for their winter's supply. In New England the market is good for stove anthracite at \$9.20, but other sizes are not wanted. Egg and nut are \$8.25. Pea and steam sizes are practically unsalable at any figure.

Spot furnace coke is still firm at \$3. There is no distress tonnage. Consumption is believed to have stopped decreasing. No additional furnaces seem likely to go out, but no furnaces are likely to be lighted. An eastern furnace, covered to Oct. 1, has been sounding the market on fourth-quarter contract, and finds the \$3.25 price quoted firmly, but holds out for \$3. Medium-sulphur coke is showing more strength, out for \$2.90, a fairly stiff price seeing that standard coke is only \$3.

Heating coke is fairly steady, but demand is light and first drawings appear every now and then to disturb prices, sometimes going down to \$2.50, when producers would like to obtain \$2.75 on fair grades of heating coke. Foundry coke is rather dull but is quite firm at \$4 to \$4.50.

Car Loadings, Surplusages and Shortages

	Cars Loaded		Car Shortage	
	All Cars	Coal Cars	All Cars	Coal Cars
Week ended Aug. 2, 1924	945,731	144,865		
Previous week	925,859	146,057		
Week ended Aug. 4, 1923	1,033,130	190,519		
			Surplus Cars	Car Shortage
July 31, 1924	322,530	146,840		
Previous week	344,892	158,606		
July 31, 1923	76,453	6,546		9,570
				4,774

Foreign Market And Export News

Steadier Tone in British Coal Market; Output Jumps 521,000 Tons

The South Wales coal market reflects an increased steadiness of tone, with a slight improvement in inquiries, especially for large admiralty and bunker smalls. The volume of business, however, continues at such a low level that a number of operations are finding it difficult to work on a profitable basis. Therefore it would not be surprising if several collieries were to close down soon.

Output by British collieries, a cable to *Coal Age* states, registered a marked increase during the week ended Aug. 2, 5,010,000 tons having been produced, according to the official reports. This compares with a production of 4,489,000 tons during the week ended July 26.

British coal exports during the first half of 1924 declined 8,714,299 tons from the figures of the corresponding period in 1923, due to less buying on the part of Germany, Holland, Belgium and France, according to a report to the Department of Commerce by Trade Commissioner C. E. Lyon, at London. The United States took but 55,000 tons in 1924 as compared with 659,354 tons during the corresponding period of the previous year, when abnormal conditions existed.

Spanish Mine Owners Would Limit Coal Imports

At a conference of Spanish coal producers held recently in Madrid it was decided to petition the government to institute measures to increase the use of domestic mined fuel. A strict tariff is recommended and also the erection of electric central stations in the neighborhood of pits. It is also proposed that foreign imports be limited, that all the national services (army, navy, etc.) and industries be compelled to use only Spanish coal and that the floating depots which are used for storing imported coal be abolished. The import duties and taxes adjusted so that Spanish coal will benefit at the

expense of the product of foreign mines. It is urged in support of the recommendation that Spanish miners are working only 5½ hours daily against 7 in foreign mines.

French Domestic Demand Firm; Industrial Coal Week

The situation in the French coal market is unchanged. On the whole the demand for industrial coals continues weak, though it is increasing somewhat in some sections. House coals are in a satisfactory position and coal producers are committed well into the fall.

Deliveries of coke to the O.R.C.A. for the month of July amounted to 358,861 tons, or a daily average of 11,577 tons. For the first five days of August the deliveries through Ehrang and Aix-la-Chapelle were 39,525 tons, a daily supply of 7,905 tons. Deliveries are being curtailed at the request of French industrialists, who find themselves unable to find storage space for any more coal. Meantime fuel is being temporarily stored in the Ruhr.

The price of coke has not been changed and probably will remain on the present level (150.75 fr. all O.R.C.A. charges included) for the month of August.

Indemnity fuel deliveries for the first twenty-eight days of July to France and Luxembourg were 346,288 tons of coal, 454,689 tons of coke and 22,616 tons of lignite briquets, a total of 823,593 tons.

Agreements with the M.I.C.U.M. are to be prolonged on the following basis: (1) Gratuitous deliveries of reparation coal will be continued as in the past. (2) Licenses and derogation levies will be reduced by 50 per cent as of Aug. 1. (3) The coal tax is reduced to 25 pf. per ton from Aug. 1. (4) The coal tax for July is reduced to 50 pf.

This agreement has been renewed

until such time as the Dawes plan is put in operation. However, as from Aug. 15, the Commission of the Six (German industrialists) will have the right to denounce this agreement on five days' notice. When these accords were renewed on June 30 the different taxes and levies had already been reduced 50 per cent. This further reduction will oblige France to finance deliveries a little more than during the past by an increased deduction from the guarantee funds. It is not known yet in what measure the Reich will intervene financially, but its intervention seems now quite feasible as its budget presents a credit balance.

Export Clearances, Week Ended Aug. 16, 1924

FROM HAMPTON ROADS

	Tons
Dan. Str. Anna Jensen for Halifax	2,076
Ital. Str. Labor for Three Rivers	5,640
For Cuba:	
Br. Str. Berwindmoor for Havana	9,646
For Germany:	
Ger. Str. Emden for Hamburg	4,618
For Italy:	
Ital. Str. San Giuseppe for Porto Fer- rajo	7,030
Ital. Str. Robilante for Porto Ferrajo	9,653
Jap. Str. Kofuku Maru for Genoa	7,789
For South Africa:	
Nor. Str. Skogheim for St. Lucia	3,847

FROM BALTIMORE

	Tons
Amer. Str. Mangore for Daiquiri	5,521

FROM PHILADELPHIA

	Tons
For Cuba:	
Nor. Str. Vindegen for Antilla
For Italy:	
Jugoslav. Str. Vojvoda Putnik for Genoa

Hampton Roads Pier Situation

	Aug. 7	Aug. 14
Cars on hand	1,761	1,680
Tons on hand	103,404	103,370
Tons dumped for week	122,403	156,371
Tonnage waiting	25,000	25,000
Virginian Piers, Sewalls Pt.:		
Cars on hand	1,118	1,253
Tons on hand	80,700	94,700
Tons dumped for week	94,411	80,119
Tonnage waiting	2,250	15,880
C. & O. Piers, Newport News:		
Cars on hand	1,526	1,334
Tons on hand	80,333	73,100
Tons dumped for week	103,646	116,696
Tonnage waiting	9,200	5,670

Pier and Bunker Prices, Gross Tons

PIERS

	Aug. 9	Aug. 16†
Pool 9, New York	\$5.25@\$5.40	\$5.25@\$5.40
Pool 10, New York	4.25@4.50	4.25@4.50
Pool 11, New York	4.00@4.15	4.00@4.15
Pool 9, Philadelphia	4.70@5.00	4.70@5.00
Pool 10, Philadelphia	4.45@4.70	4.45@4.70
Pool 11, Philadelphia	4.30@4.50	4.30@4.50
Pool 1, Hamp. Roads	4.15	4.15
Pool 2, Hamp. Roads	4.05	4.05
Pools 3-6-7 Hamp. Rds.	4.00	4.00

BUNKERS

	5.00@	5.25	5.00@	5.25
Pool 9, New York	5.00@	5.25	5.00@	5.25
Pool 10, New York	4.75@	5.00	4.75@	5.00
Pool 11, New York	4.50@	4.75	4.50@	4.75
Pool 9, Philadelphia	5.00@	5.30	5.00@	5.30
Pool 10, Philadelphia	4.75@	4.95	4.75@	4.95
Pool 11, Philadelphia	4.50@	4.70	4.50@	4.70
Pool 1, Hamp. Roads	4.20		4.20	
Pool 2, Hamp. Roads	4.10		4.10	
Pools 3-6-7 Hamp. Rds.	4.00		4.00	

Current Quotations British Coal f.o.b. Port, Gross Tons

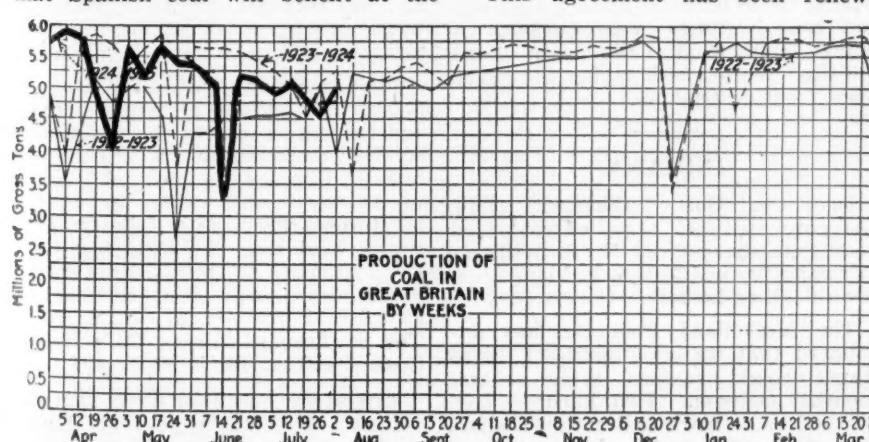
Quotations by Cable to *Coal Age*

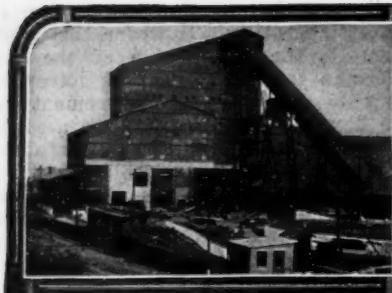
	Aug. 9	Aug. 16†
Admiralty, large....	28s. @ 28s.6d.	28s. @ 28s.6d.
Steam smalls....	17s.	17s.

Newcastle:

Best steams....	21s.	22s. @ 22s.6d.
Best gas....	23s.	22s. @ 22s.6d.
Best bunkers....	20s.	20s.6d.

† Advances over previous week shown in heavy type, declines in italics.





ALABAMA

The Dixie Coal Mining Co. is erecting a new washery at the McCollum mine, Walker county near Jasper.

A state-wide first-aid meet will be held in Birmingham, Oct. 7, under the auspices of the U. S. Bureau of Mines and the Alabama Coal Mining Institute. Teams desiring to participate in the meet must file applications with J. J. Forbes, U. S. Bureau of Mines, Federal Building, Birmingham, Ala., on or before Sept. 15.

The Sayre mines, in the western part of Jefferson County, Alabama, near Birmingham, belonging to the Gulf States Steel Co., are the first coal mines in Alabama to protect thoroughly the interior of the mines with limestone dust, 20,000 lb. of limestone dust being used.

The new development work of the Moss and McCormack Mining Co., near Carbon Hill, Walker County, is making good progress, an extension being made to the new mine from the spur of the Frisco Railroad serving No. 11 mine of the Calloway Coal Co. The company has opened an office at Carbon Hill and C. E. Crandell is superintendent in charge of the work. The lands on which the development is being made were obtained from the federal government when the royalty rights were auctioned by the land department a year or more ago.

ARKANSAS

Scranton Anthracite Coal Co. is pumping out its mine and will soon resume.

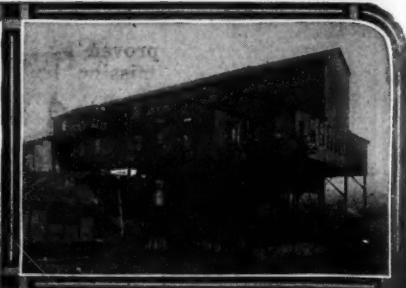
COLORADO

The thirty coal salesmen for the Colorado Fuel and Iron Co. spent a week early in August visiting the company's mines and comparing notes at the headquarters in Denver.

Three 500-ft. entries have been driven by the Moffat Coal Co. in the Elkhead country and a wagon road is being built. The coal is said to be a fine grade of anthracite. It is hoped to have a railroad built to the mine by the time the great Moffat tunnel is completed.

An explosion in the new Alamo mine near Walsenburg, early on the morning of August 5th, killed Alex MacBirnie, a fireboss and shut down the mine for a week. The man was alone at the time of the explosion. His body was found partly covered by a fall of the roof. There were evidences all around indicating that an explosion had been generated at that spot. The mine

News Items From Field and Trade



which is still in its development stage, was not seriously damaged according to Harry F. Nash, general manager.

G. W. Harris of Denver, president of the Colorado and Utah Coal Co., is back at his desk after suffering a broken leg, sprained ankle and lacerated scalp in an accident last month. An automobile struck him as he was riding a horse. He was thrown clear over the machine and the horse capped the climax by falling on him.

The Bluff Springs Coal Co., which operates south of Florence, is making expansions and improvements. A spur will be built from the Santa Fe branch at Nushaft to the Bluff Springs mine, a distance of 2,200 ft. The old Donnelly slope has been taken over by the company, and a tipple will be built to accommodate it.

Two recent reorganizations in Colorado coal companies have been effected. W. W. Cowdery becomes president and general manager of the Crown Fuel Co. with a mine near Gorham. R. A. Pierce, former general superintendent and part owner is now chief engineer for the Colorado and Utah Coal Co. and W. A. Snyder, former general manager leaves the company. The Leyden Coal Co. also has undergone a shrinkage of executive forces. General Manager W. D. McCausland and General Supt. James Virgin withdrawing. John A. Sire is general superintendent and operating head of the mine organization. The entire sales force has been dismissed. The output will be sold by the Barnett Fuel Co. of Denver, wholesalers.

ILLINOIS

A fire recently wiped out the business section of Freeman, a small mining town six miles southwest of West Frankfort. The damage is estimated at \$35,000. Ten frame structures, including seven business houses, a garage and two dwellings were burned. A change in the wind at the height of the fire was credited with saving the entire town from destruction.

INDIANA

Enos Coal Co., of Cleveland, Ohio, has purchased 145 acres of coal land near Petersburg from R. R. Williams of Evansville and \$100,000 of land from several other holders.

The McClelland Coal Co. has announced that its mine south of Terre Haute would re-open after several months' idleness. Two hundred men will return to work and within a short time from fifty to one hundred more

men will be placed at work there. Several of the larger mines in the Terre Haute-Clinton fields and in the field south of Terre Haute, recently have resumed operations.

KENTUCKY

The Kentucky Railroad Commission on Aug. 1 granted permission to the Chesapeake & Ohio R.R. to operate the Long Fork, Millers Creek and Ashland Coal & Iron Railroads, which the C. & O. arranged to take over some time ago, as feeders in its eastern Kentucky territory.

Announcement has been made by Willard R. Jillson, Kentucky geologist, of a new book to be issued shortly, on "The Mountains of Eastern Kentucky," as prepared by Professor D. H. Davis, geographer of the University of Minnesota, who has spent several summers studying Kentucky coal, oil and other resources. Coal, says Professor Davis, was noted in the Kentucky basin by Christopher Gist as early as 1759.

Reports from Owensboro state that the new Owensboro, Rockport & Chicago Ry. Co., which has asked the Interstate Commerce Commission for right to build a bridge and eighty-four miles of road to El Dorado, Ind., there connecting with the Chicago, Milwaukee & St. Paul to the North and Northwest, is also discussing plans for building the line to Central City, Ky., in the heart of the western Kentucky coal fields.

The Hardy-Burlingham Mining Co., at Hardburley, Lotts Creek, Hazard field, is said to be planning to make new openings and increase capacity. The company is said to have the largest capacity wooden tipple in the field, and its output does not nearly equal its capacity. It was also reported that the East Kentucky Coal Co., at Fuson, Ky., had resumed operations, with some large orders, after being down for months.

The State Tax Commission has certified to the auditor of public accounts and the county courts the assessments on five companies in Pike County and one in Hopkins County. All assessments are considerably higher than heretofore. They are as follows: Edgewater Coal Co., \$577,592; Big Sandy Co., \$1,225,010; Consolidation Coal Co., \$1,028,167; Colony Coal & Coke Co., \$393,610; Fordson Coal Co., \$2,975,028. The St. Bernard Mining Co.'s Hopkins County assessment is \$2,393,497.

Engineers have located on the headwaters of Elkhorn Creek, Letcher County, to make surveys for a link be-

tween the Louisville & Nashville R.R. and the Carolina, Clinchfield & Ohio R.R. under a lease approved by Interstate Commerce Commission but not yet accepted by the L. & N. The line if constructed will run from McRoberts, Letcher County to Elkhorn City, Pike County and will give it is said the southeastern Kentucky fields a new outlet, a Gulf Seaboard market and an extended operating area.

MINNESOTA

The Reeves Coal and Dock Co., which is constructing a new dock at Superior, Wis., has announced that the new dock will be in readiness by the opening of navigation next spring. The present dock which is under demolition will be out of the way early next month.

MISSOURI

C. A. Norton, for the past four years secretary and treasurer of the Wallace Coal Co., has resigned to engage in another line of business in Chicago.

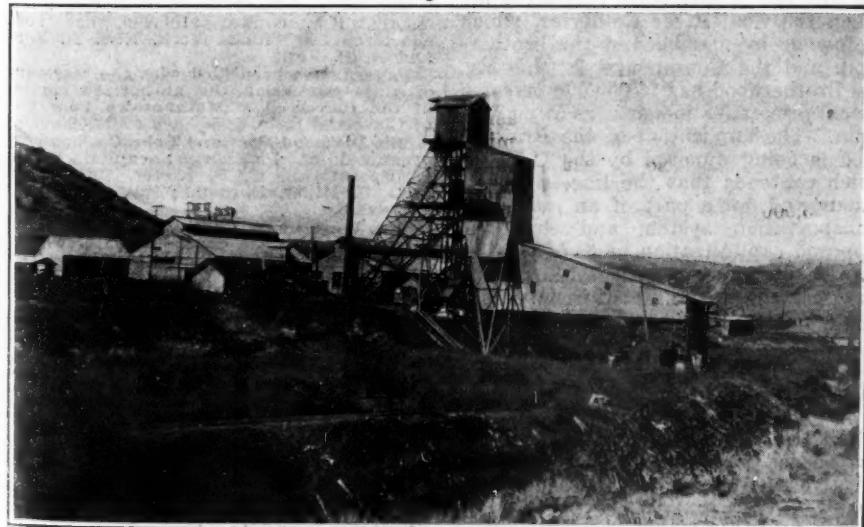
Harvey L. Salmon, for many years connected with the fuel department of the Missouri Pacific R.R., has recently resigned to engage in the auto-painting business in the northern Pacific coast. He is associated with B. F. Bush, who recently resigned from the Missouri Pacific as president.

MONTANA

David Phillips, Henry Brauenstein and Henry Unschedl, all of Minneapolis, have reorganized the Gilbert & Crawford Coal Co. operating mines at Roundup.

NEW MEXICO

The Hagan Coal Mines, Inc., has connected its new mine, 30 miles from Albuquerque, with a Santa Fe spur and is bringing the mine up to a larger production. A steel tipple is now getting its final touches. W. H. Stark of Orange, is interested in this mine.



Courtesy U. S. Distributing Corp.

Tipple at Dietz, Wyo., of Sheridan-Wyoming Coal Co.

In the northern part of Wyoming is a coal area known as the Sheridan field, it being named after the principal town of the northern half of the state. The principal centers in this coal area are Sheridan, Acme, Carney, Monarch, Kool and Dietz. The field is adjacent to the Fort Mackenzie Military Reservation.

OHIO

H. H. Heiner, formerly president of the Maynard Coal Co., who has been out of the business since that concern went into the hands of receivers, has been seriously ill with ptomaine poisoning at his home. He is now believed to be out of danger.

Joe Richards, general manager of the Blue Diamond Coal Co.'s mines, who has been ill for the past 15 months, a large part of which was spent in a hospital at Lexington Ky., is able to be about once more and is convalescing near Winchester, Ky.

The Southern Ohio Coal Exchange reporting for the week ending July 22 shows a total production of 79,279 tons from 439 mines reporting, which had a combined capacity of 638,285 tons. This leaves a shortage of 559,006 tons. Labor shortage was responsible for a loss of 8,583 tons; strikes, 8,825 tons; mine disability, 5,075 tons and "no market" 536,523 tons.

Following a series of meetings of the officials of the Southern Coal & Coke Co. it is said that N. L. Mahan, sales manager at Cincinnati, will resign as of Sept. 1 and will be succeeded by Louis Stone. E. L. Gatliff is slated to become secretary of the company. It is also understood that one of the group of mines of the Southern has been sold and another is on the market. On the other hand there is said to be a move on foot to consolidate still more mines with this group.

Imposition of a tax on every ton of coal mined in Ohio has been suggested by the Ohio State Teachers' Association as a means of financing the schools in mining districts of the southern and southwestern sections of the state. In spite of the great natural wealth of the mining districts, revenues received from taxation are totally inadequate properly to finance the schools.

The Association says that in the schools districts of the mining sections, the coal in the ground is listed for practically nothing, though, a steady stream

of wealth pours forth on which no taxes are collected.

Grover C. Angel, sales manager for the Main Island Creek Coal Co. for several years past, has resigned. B. Lee Hutchinson, who was largely instrumental in the consolidation of the various entities of the Hutchinson Island Creek Coal Co. will take over this work as general sales manager. Main offices in Cincinnati have been engaged and a further change may be made in the name of the corporation. "Big Mac" McAllister, who had charge of the Main Island Creek mines, with headquarters at Omar, W. Va., it is understood, will direct the mechanical affairs of the new organization.

Columbus operators were notified recently that the Hocking Valley R.R. has placed an embargo against all coal from connecting lines, even the Chesapeake and Ohio, of which the Hocking Valley road is a subsidiary. The reason for this action, which is unusual at this time of the year, is that the Hocking Valley has 5,400 cars of coal on the line between Columbus and Toledo. The congestion is due to the fact that many boats have been withdrawn from service at Toledo, so that the coal cannot be taken to the docks in the Northwest as rapidly as it is received at Toledo. Some boats have been taken off temporarily as the owners do not care to take coal up the lakes unless there is a downward bound cargo of iron ore and the movement of ore is light at this time.

PENNSYLVANIA

Thomas J. Bray, of Youngstown, Pa., president of the Republican Iron & Steel Co., suffered a heat stroke Aug. 10, at the Oakmont Country Club, Oakmont.

Stock in the Lehigh Valley Coal Co. is being sold to employees on the monthly payment plan, deductions being made on the payroll on request of the applicant at the rate of \$3 per share per month, instalments paying interest at 6 per cent.

Production in central Pennsylvania for the week ending Aug. 9, was 11,482 car loads, as compared with 11,330 car loads for the previous week. The total production for August to and including the ninth, was 14,234 car loads, against 12,129 cars for the same period in July. However, the July period had a holiday season which cut down the production.

Miners employed by the Consumers Fuel Co. at Harmarville struck Aug. 7, a few days after they had returned to work after a six-weeks' lay-off due to lack of orders. The strikers complain against working conditions and agreements. Officials ordered the men to take their tools and leave the workings.

The State Workman's Compensation Board has dismissed the appeal of the Pennsylvania Coal & Coke Co. from the award to the widow of Mike Harchuck who died of blood poisoning. When working on a pipe line his fingers were hurt and death followed a few weeks later. The company contended,

and presented testimony tending to show, that his blood had been poisoned in a blood-letting operation.

Two miners lost their lives Aug. 6, three others were seriously injured and one hundred miners had narrow escapes when a rock-fall occurred in Springfield Mine No. 1 in Nant-y-Glo, Cambria county. The fall occurred just as the day shift was entering the mine, in a trip of twenty mine cars. They were one half mile from the entrance when many tons of rock gave way, burying two of the wagons.

The Neilson colliery, at Shamokin, which has been acquired by a group of Wilkes-Barre investors, has been refinanced and work is to be started shortly. It is estimated by the company's engineers that with sixteen beds of coal, about 24,000,000 tons of virgin coal is available. The improvements to the present operation include an electrically equipped breaker, capable of preparing 1,500 tons of coal daily.

Two deaths were caused within a few minutes Aug. 10 by a high tension electric wire at the entrance to the No. 3 mine of the H. C. Frick Coke Co. at Mt. Pleasant. One of the fatalities occurred when a man who had gone to investigate the death of the first victim, a boy, lost his balance and seized the wire as he fell.

The boy was picking coal, when in some undetermined manner, he came into contact with the high voltage wire.

The Northwestern Mining & Exchange Co. and the Blossburg Coal Co., of DuBois, Pa., announce the signing of a contract with the Peabody Coal Co., by which the latter company will continue to manage the mines of the former companies for a period of ten years. The Blossburg Coal Co. has three mines which produce a total of 1,000 tons per day. Seven mines of the Northwestern Mining & Exchange Co. yield 5,000 to 6,000 tons daily. The new Kramer mine of this company is involved in the contract. At present it is producing only 400 tons of development coal per day. It is equipped to handle 4,000 tons per day; early in the fall it will start to run room-and-pillar coal. When running at capacity all these mines will produce about 10,000 tons of coal per day.

WEST VIRGINIA

The E. E. White Coal Co. has had for several months a blanket insurance on the life of every one of its employees. The family of a colored employee, who died at Glen White recently, is the first beneficiary.

The Island Creek Coal Co. has completed work on a new steel tipple at its No. 14 mine at Holden, W. Va., which mine is again in operation. A new steel tipple replacing an old wooden structure at No. 1 mine of the Main Island Company at the mouth of Trace Fork has also been completed.

The Flat Top Fuel Co. of Bluefield, W. Va. shipping Pocahontas, Tug River and New River coals, over the Norfolk & Western, the Chesapeake & Ohio and Virginian railways, established a new

world record a few days ago when the British steamship Poloevera passed out of Cape Henry en route to Rio de Janeiro, Brazil with 13,599½ tons of coal, the largest tonnage, according to official records, ever loaded on a single ship at the Norfolk & Western piers. The cargo so shipped was valued at about \$53,000.

Tenants will be evicted by the Charleston Coal Mining Co., at Handley, and by the Coalburg-Kanawha Coal Co., at Coalburg, in order to make way for non-union miners. These mines which made a contract with the union are now attempting to work on an open-shop basis after trying to obtain a wage concession.

Experiments are being conducted by the Bertha Consumers Coal Co. at its Rachel mines at Downs in northern West Virginia with a special type of conveyor, designed by attaches of the company and made by the Fairmont Mining Machinery Co. The conveyor works on a 45-deg. face similar to that used in the V system. Joy and Myers-Whaley loaders are being used at the Eureka mine, Randall, Monongalia county.

Several diamond drills are at work and crop-coal openings are being cleaned out in the Richmond district of Raleigh county. This is regarded as evidence that the railroad up Glade Creek will be extended and more New River coal developed.

The large store and office building, the recreation hall and several residences occupied by department heads of the Superior Pocahontas Coal Co. at Davy, McDowell county, W. Va., were totally destroyed by fire during the closing days of June. The combined store and office building was constructed of native sandstone and three stories high. The loss sustained is about \$100,000. The company will rebuild.

The Brotherhood of Locomotive Engineers has filed an application with the Interstate Commerce Commission for authority to operate the Coal River & Eastern Ry. in interstate commerce between the Coal River Collieries, which are owned by members of the brotherhood, and the Chesapeake & Ohio Ry. The Brotherhood has \$3,000,000 invested in coal properties in southern West Virginia. The application of the Brotherhood is being opposed by the C. & O., which contends that the line is simply a spur and not a part of an interstate transportation system and that the proposed capitalization of \$1,500,000 of the Coal River & Eastern Ry. is grossly exaggerated, the value of the surface rights not being \$750,000 as claimed.

WISCONSIN

The Great Lakes Coal and Dock Co. has leased the docks in Milwaukee, Wis., formerly occupied by the Central Coal Co.

Paul Galleher, city agent for the Northwestern Fuel Co. at Superior, Wis., has left for St. Paul where he will be in charge of one of the company's city offices. Charles A. Rogers will succeed him.

WYOMING

The Wyoming & Colorado short line railroad has asked the Interstate Commerce Commission for authority to construct a line from Casper southwest to the state line between Colorado and Utah, 381 miles long. Iron and bituminous coal fields will be traversed by the railroad if built.

CANADA

On Aug. 2 an explosion occurred at the Midland Collieries, Drumheller, Alta., causing the deaths of three men, Harry Duhockle, outside foreman, James Nichol, pit boss, and Griffith Richards, pump boss. Malcolm Richards, fire boss, was gassed.

Many of the Toronto coal dealers with yards along the water front and in the north-west section of the city are looking for new locations as a result of the work that is to be started on the lake front viaduct and subways in the vicinity of Bloor St. West. Considerable difficulty is being experienced in finding suitable properties with railway sidings.

Recent Patents

Mining Machine; 1,488,518. W. W. Robbins, Lorain, Ohio. April 1, 1924. Filed Dec. 19, 1920; serial No. 428,290.

Implements for Cleaning the Threads of Miners' Safety Lamps; 1,488,648. Franklin G. Redington, Wilton, N. D. April 1, 1924. Filed May 7, 1923; serial No. 637,290.

Coal-Mining Machine; 1,488,766. John Quist, Mystic, Iowa. April 1, 1924. Filed May 2, 1921; serial No. 466,049.

Mining and Loading Machine; 1,489,600. Joseph F. Joy, Pittsburgh, Pa., assignor to the Jeffrey Mfg. Co., Columbus, Ohio. April 8, 1924. Filed Oct. 17, 1916; serial No. 126,150. Renewed March 18, 1921; serial No. 453,477.

New Companies

With a capital of \$25,000, the Hatfield Coal Co., Covington, Ky., has been chartered by J. T. Hatfield, Charles A. Hunt, and M. H. McLean.

The Sharon Pond Creek Coal Co., Shandonale, Ky., capital \$100,000, has been chartered by William York, Elva H. York and A. B. York.

Papers have been filed with the secretary of state increasing the authorized capital of the Cleveland & Morgantown Coal Co. of Cleveland from \$1,500,000 to \$2,000,000.

The Diamond Coal and Coke Co. has been organized at Pittsburgh; capital \$5,000. Incorporators: C. F. Kiefer, Pittsburgh; J. D. C. Miller, Dormont; David E. Meigs, Swissvale.

The West Coast Collieries Ltd. has been incorporated with a capital of \$525,000 and head office in Toronto. The company will operate throughout Canada. Arthur W. Holmstead, Douglas L. Ross, Leonard V. Sutton and others are incorporators.

The Mender-Patton Coal Co., 77 W. Washington St., has been chartered with an authorized capital of \$10,000 to mine coal and deal in coal and coke. Incorporators are: William F. Patton, Hazel G. Patton, Earl D. Mender, R. D. Graham and Carl Mathews.

The Peerless Elkhorn Coal Co., chartered recently with an authorized capital of \$150,000, has been organized by the election of F. G. Hatton, president; W. M. Brown, vice-president and George S. Schwartz, secretary. The officers are the same as of the Hatton Brown & Co., Inc., of which company it will be a subsidiary. The new concern has acquired two large properties with two working mines in the Elkhorn field of Kentucky, located on the Big Sandy division of the Chesapeake & Ohio RR. Extensive improvements will be made to increase the capacity of the mines.

Traffic News

Perry County, Illinois, Operators Seek to Have Freight Rate Sustained

Sixteen coal companies of southern Illinois, including the Perry County Coal Co., are endeavoring to have sustained a reduced rate on coal recently ruled by the Interstate Commerce Commission. The Alton & Southern Ry. and a dozen other companies are contesting the decision before Circuit Court Judge Crow, of Belleville, Ill.

The freight rate on coal for a thirty-mile haul is to be reduced, if the County Court permits, from 91c. to 70c. per ton and for any distance from thirty to seventy-two miles to 80c. per ton. The railroads say these rates will not be remunerative. The new tariff is ordered for Aug. 25.

Fight For and Against Twin City Freight Rate

The Twin City Rapid Transit Co., operating the street railway system of these cities, has entered its protest against the revised freight rates on all rail coal, to the interstate commerce commission, following similar action by the Hydraulic Press Brick Co., Minneapolis, the Waldorf Paper Products Co. and the Northern States Power Co., all as large consumers of Illinois coal. On the other hand, the Northwestern Coal Dock Operators' Association has entered a protest against a rehearing of the case. It is still an open question whether there will be enough pressure brought to bear upon the commission to induce a suspension of the new rates on all-rail coal, effective by Sept. 10. Hints have been made of a possible injunction being asked to prevent the rates going into effect.

Superior, Wis., through its city commission, is starting an investigation to determine whether the city is being discriminated against in the matter of coal freight rates.

Revision of Dockage Rates

The Public Service Commission of New York State has approved a charge on New York Central Lines of 25c. per net ton for unloading from vessel, handling from dock and dumping into lighter on bituminous coal arriving by vessel at West Shore Coal and Ore Dock, Buffalo, and transferred by machinery and other facilities furnished by the West Shore R.R. An allowance of 17c. per net ton will be made to the Ashtabula & Buffalo Dock Co., contractor, for service performed in handling the coal as described above.

Trade Literature

National Arches. M. A. Hoff Co., 814 West Washington Ave., Indianapolis, Ind. Pp. 15: 8 x 11 in.; illustrated. This booklet points out the lower maintenance costs with the use of these arches, their outstanding advantages, ease of installing and replacements.

American Cast Iron Storage Tank. Conveyors Corporation of America, Chicago,

Ill. Pp. 11, 4 x 8½ in.; illustrated. This is a sectional tank for the storage of dry, loose, bulky material, such as ashes, coal, etc. The booklet contains table of weights, measures and capacities.

Manganese Steel Castings for Mines. American Manganese Steel Co., Chicago Heights, Ill. Catalog No. 5. Pp. 76; 8 x 11 in.; illustrated. Covers the use of manganese steel castings for ball and tube mills, buckets, conveyors, crushers, shovels, etc.

Waughhammers. The Denver Rock Drill Mfg. Co., Denver, Colo. Pp. 15; 6 x 9 in.; illustrated. This bulletin is devoted chiefly to describing Model 92, a wet or dry sinker, and Model 95, a dry sinker. Model 37, heavy duty sinkers, drifting drills, stoppers, drill steel sharpener, drill steel puncher, and comparascope are among the equipment mentioned.

Industrial Lubrication. Waverly Oil Works Co., Pittsburgh, Pa. Pp. 44; 3½ x 6½ in. The lubrication charts in the back of this book should prove interesting to anyone who has to do with the lubrication of machinery.

Heine Cross-Drum Boilers. Heine Boiler Co., St. Louis, Mo. Bulletin No. 53. Pp. 29; 8 x 11 in.; illustrated. Describes the M and MC types of Heine boilers, the former equipped with horizontal baffles and the latter with cross baffles.

Tramrail. Cleveland Crane & Engineering Co., Wickliffe, Ohio. Catalog No. 3 Pp. 220; 8 x 11 in.; illustrated. Describes system of hoisting and conveying loads for warehouses, etc.

The Crouse-Hinds Co., Syracuse, N. Y., recently issued the following bulletins: **New Ideas in Electric Hand Lanterns**, Folder No. 10. **Vaporproof Condulets with Reflectors**, Bulletin No. 2057. **Condulets for Concealing in Concrete**, Bulletin No. 2059. The bulletins are 4x9 in., illustrated.

Sullivan Machinery Co., Chicago, Ill., recently issued the following bulletins: **Vacuum Pumps**, Bulletin 78-B; 11 pp.; describes its straight-line steam-driven and belt-driven vacuum pumps for vacuum service. **Belt-Driven Air Compressors**, Bulletin 77-K; 16 pp.; describes the Sullivan belt-driven wafer-valve air compressors, class WG-6 single stage and class WH-6 two-stage. This company also has issued new editions of Bulletin 77-H, **Angle Compound Compressors**, and Bulletin 70-X, **Compressed Air Spader**. These bulletins are all 6x9 in. and illustrated.

Obituary

John P. Hebenstreit, aged seventy-five, superintendent and vice-president of the Illinois Coal Corporation, recently died of apoplexy, at his home in Nokomis, Ill. He was one of the well-known coal operators of Illinois and had spent years in the coal mining industry.

Coming Meetings

New York State Coal Merchants Association, Inc. 14th annual convention, Sept. 4-6, Stamford-in-the-Catskills, N. Y.; headquarters Churchill Hall. Executive secretary, G. W. F. Woodside, Arkay Building, Albany, N. Y.

American Chemical Society. Fall convention Sept. 8-11, 1924, at Ithaca, N. Y. Secretary Gas and Fuel Section, O. O. Mallei, the Koppers Co., Pittsburgh, Pa.

Oklahoma Coal Operators' Association. Annual meeting Sept. 11, 1924, McAlester, Okla. Secretary, A. C. Casey, McAlester, Okla.

Association of Iron and Steel Electrical Engineers. Annual meeting and exposition at Duquesne Garden, Pittsburgh, Pa., Sept. 15-20. Secretary, John F. Kelly, 1007 Empire Bldg., Pittsburgh, Pa.

National Safety Council. Thirteenth annual safety congress Sept. 29 to Oct. 3, Louisville, Ky. Managing director and secretary, W. H. Cameron, 168 No. Michigan Ave., Chicago, Ill.

American Institute of Mining and Metallurgical Engineers. Fall meeting, Birmingham, Ala., Oct. 13-15. Secretary, F. F. Sharpless, 29 West 39th St., New York City.

American Institute of Electrical Engineers. Fall convention, Pasadena, Calif., Oct. 13-17. Secretary, F. L. Hutchinson, 29 West 39th St., New York City.

New Equipment

Oxygen Manifold Has Valve That Cannot Blow Out

What is said to be an absolutely foolproof valve for oxygen manifolds has been devised by the Oxweld Acetylene Co., of 30 East Forty-Second St., New York City. The body has a formed seat receiving the stem tip 2. This tip is attached to and carried by the stem 4, by means of a swivel joint.

Thus, the tip is enabled to seek its own natural seat in the body. The stem screw is in the inner end of the stuffing box 6, which is made gas-tight into the body by means of a lead gasket. The stem itself is made gas-tight by the rubber packing, which is compressed between packing rings by means of the handwheel and nut.

If the operator should happen to unscrew the handwheel all the way, there is no possibility of the internal part being blown out by pressure, because the stem screws into the stuffing box. Even if he should unscrew both the stem and the handwheel, the parts could not come out because the large end of the stem would lodge against the inner end of the stuffing box.

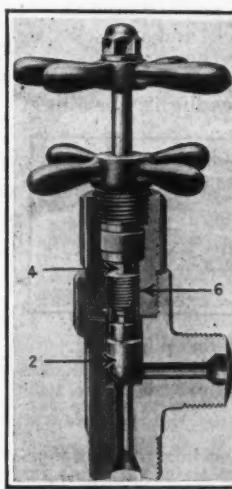
Power Plant for Gassy Mines Moved Around on a Truck

The first approval of a portable electric power plant for use in gaseous mines has been given by the Bureau of Mines, to the Mancha Storage Battery Locomotive Co. and covers a special truck of locomotive type containing battery cells of sufficient number and capacity to operate a coal-cutting machine.

One of the chief causes of electrical accidents in coal mines is sparking or arcing of electric wires. A wide application of the storage battery may be the solution of this problem by doing away with all permanent wiring in gaseous or dusty mines.

The advantages claimed for the portable power plant are that it permits the elimination of feeder circuits and that it gives more rapid and satisfactory operation of the mining machine, owing to uninterrupted power supply and non-fluctuating voltage.

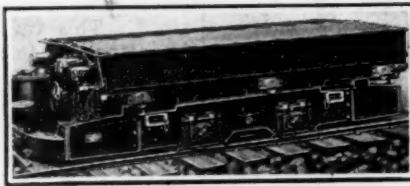
The power truck has a single motor connected to both axles by a worm and



gear. Its weight complete is from 10 to 12 tons. The battery equipment available differs for the various types which may be used.

An individual service plug and receptacle is provided for connection of the mining machine cable to the battery. The mining machine circuit is fused at the battery box with the same type of combination fuse and switch as is used for the main circuits of the truck. With this arrangement the power can be cut off from the mining machine either at the cable reel or at the battery. The service plug is locked in place by means of a padlock, and therefore the power truck and coal-cutting machine operate together as a unit.

The motor, controller, resistance, main fuse box, headlight, headlight



Power Plant on Wheels

Taking the power plant to the motors may seem to be a novel experiment to some of us, but in gaseous mines or places rapidly developing, much of this is done.

switch, headlight fuse box and ampere-hour meter housing, after having been subjected to rigid inspection and tests in explosive mixtures of Pittsburgh natural gas and air, were judged to conform to the requirements of Schedule 15 of the Bureau of Mines, which states the procedure for establishing a list of permissible storage-battery locomotives for use in gaseous mines.

Like the flame safety lamp or any other safety equipment, the power truck can be relied upon as being safe only so long as it is carefully inspected and maintained in a safe condition. The approval plate specifically mentions points to be observed in keeping the equipment in a permissible condition.

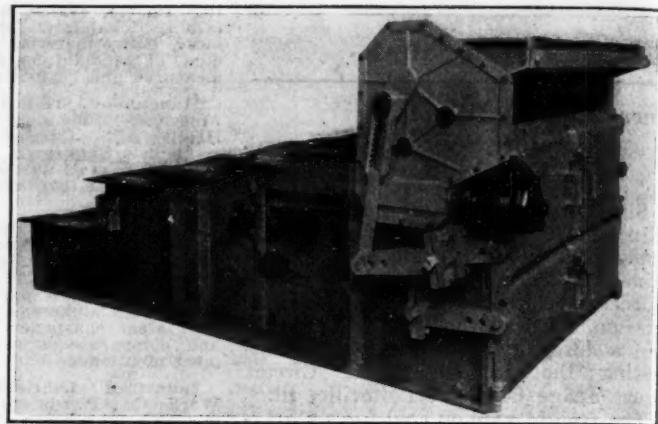
Stoker for Small Boilers

Small coal mines have thus far not found stokers suited for use under their small boilers and accordingly usually have burned large coal wastefully and with heavy firing losses. Furthermore all industry has been similarly situated, also apartment houses which use boilers for heating.

The Stoker Sales Co., 650 Old Colony

To Burn Screenings Smokelessly

This stoker makes it easy to burn small sizes, saves loss of coal to ash pit, and heat losses in firing. It also makes the use of poor coal profitable.



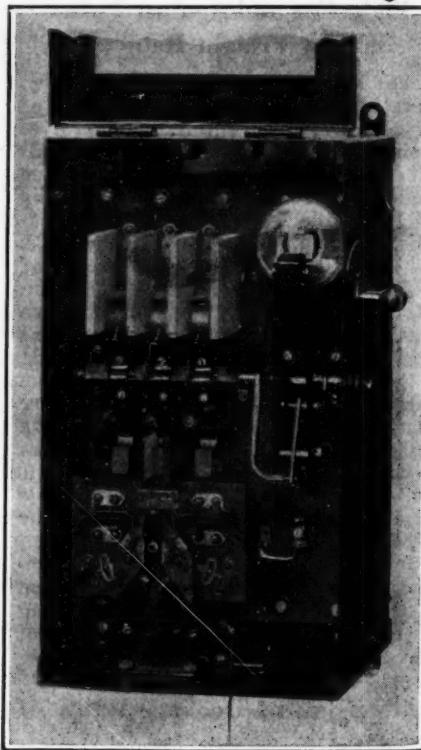
Building, Chicago, has introduced a stoker, designed by Joseph Harrington, to burn screenings or any coal below the grade of No. 2 under a boiler, consume it smokelessly and transfer the ashes into a receiving hopper. This stoker, known as the King Coal, is constructed for boilers in sizes ranging from 250 hp. downward and is well suited for western screenings. It has a reciprocating plate carried on rollers which has a travel up to 5 in., the length of travel determining the quantity of the coal fed. The grates are terraced or stepped, the first set of grate bars resting and sliding over the second step of the grate. The first and third grates have a forward and backward sliding motion (their action being simultaneous) and the second and fourth grates are stationary. By this motion the grate bars literally slide out from under the coal, the bed of coal being disturbed only by its fall over the ends of the grate bars. Because of this action, even coal with coking properties can be burned and with an efficiency said to be equal to that obtained from non-coking coals.

The plate or table directly under the ash opening at the rear supports the body of ash as it falls from the fourth grate. Having a reciprocating action it provides also a slow but definite travel of the ash toward the front, but as it at all times fills the throat or ash opening, that opening is always sealed against an inrush of cold air. By the use of this stoker most of the heat in the ash is utilized and complete combustion made possible.

Either natural or forced draft can be employed. The stoker is operated by a 1/2-hp. motor or by a hydraulic drive of equivalent power.

Starter for High Torque Duty

A new manually operated, inclosed type resistance starter suitable for starting squirrel-cage induction motors as large as 20 hp. on 550-volt circuits,

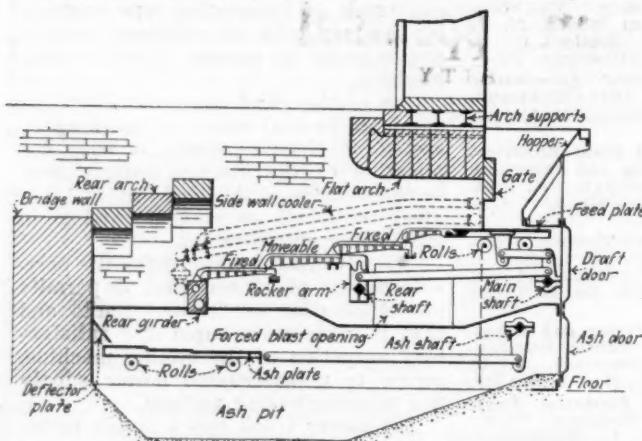


Safe Inclosed Motor Starter

Being manually operated but inclosed, this new starter is suitable for use wherever inexperienced labor is employed. The overload trip may be reset without opening the cabinet by pulling a chain hanging from the bottom of the box.

has recently been developed. The resistance is proportioned to give an inrush current three and one-half times the normal full load motor current, thus permitting the motor to develop at least 50 per cent of its full load torque while starting.

The starter is made by the General Electric Co. and is of the safety type, completely inclosed with ventilated case, externally operated and provides overload and undervoltage protection. It is furnished with a single-step resistor, equal parts of which are connected in each phase. The switching elements are of the contact finger type, strong and readily renewable.



Coal Steadily Fed Forward

Second and fourth steps of grate are stationary; the ash step and first and third steps reciprocate. Grates slide out from under coal. Quarter horsepower motor drives grate.